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ABSTRACT

The first panel of a three-year longitudinal study was conducted to investigate the process by which youth form career expectations. The study was designed around a cross-sectional path model of career expectations drawn from the sociological literature on status attainment and is based on differential equations in which all expectation variables are viewed as affecting each other in a time-continuous system of feedback loops. A random sample of approximately 700 Ohio high school sophomores completed self-administered questionnaires providing data on career expectations and socioeconomic characteristics of family members. One or both parents of each youth also completed questionnaires identifying the parents' career expectations for their children and socioeconomic data. All occupational data were coded into three-digit 1970 census codes and then transformed into codes reflecting socioeconomic content of occupations. Selected means, standard deviations, correlations, and path models were compared to previous cross-sectional research in the local area. These comparisons revealed good matches between current and past samples in broad patterns, but samples differed in specific detail. Comparison of correlations based on the subjective-probability method to those derived from traditional methods revealed that the former were consistently higher than the latter. Finally, the results involving the identification issue in cross-sectional data in which feedback loops appear were analyzed. (BM)

INTERIM REPORT ON PANEL ONE
OF A LONGITUDINAL STUDY
OF DEVELOPING CAREER EXPECTATIONS

by

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1979

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FOREWORD

This volume reports on the progress of a three-year longitudinal study of developing career expectations among high-school age youth. The unusual design and conceptualization of the study illustrate The National Center's continuing commitment to innovative research related to occupational choice.

We wish to thank the Columbus public schools for cooperating with the National Center to facilitate the data collection. In particular, thanks are due to Dr. Richard Beck of the Columbus Board of Education whose continuing support has been invaluable. The principals and counselors of Columbus high schools cooperated in important phases of the research, and we wish to take this opportunity to thank them. Hearty thanks are offered also to students and their parents who participated in the study as respondents. Clearly, the project would be impossible without their cooperation.

The authors, Lawrence Hotchkiss and Lisa Chiteji, deserve credit for their scholarly work writing this report. The National Center also extends special thanks to reviewers of the report. Jon Cunnyngham of the Department of Economics at Ohio State reviewed the econometric work in Chapter 4. Jeylan Mortimer, the Department of Sociology at the University of Minnesota, Kenneth Spenner of the Boystown Center for the Study of Youth Development, and Louise Vetter of The National Center provided excellent reviews of earlier drafts of the report. Ms. Deborah Cantan typed the manuscript with skill and patience, and she deserves recognition for that work.

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ABSTRACT

This report is part of a three-panel longitudinal study of the process by which youth form career expectations during the high school years. The contents divide naturally into two major parts. Part one describes the sample and reports limited statistical analyses drawn from the cross-sectional data for panel one. The main purpose of this part is to evaluate the degree to which results from the sample are representative of persons not in the sample. Comparisons of statistics such as percentages, means, standard deviations, correlations and path coefficients calculated from the present sample to census data and previous local samples are carried out. It is concluded that the sample offers an unusual potential for testing theoretical models of the process by which career expectations are formulated. Nevertheless, as with all scholarly research, generalizations from the sample must be made with caution.

The second part of the report presents a mathematical analysis of the identification issue in structural equations. The purpose of this analysis is to lay the foundation for the statistical work to be carried out in subsequent reports on the study. An important conclusion emerges from the mathematical analysis: Even in the presence of causal feedback, ordinary least squares regression may generate statistical estimates with better properties than the major alternatives such as indirect-least squares, two-stage least squares, or three-stage least squares. This conclusion is important because it contradicts long-held opinions among users of structural equations, and because it applies to a much broader audience than scholars engaged in study of career decision making. The conclusion should not be viewed as a license for application of ordinary least squares without serious reflection on the theoretical implications of such applications. In fact, the major conclusion of the analysis is that confidence in results of any statistical method to estimate parameters of structural equations depend heavily on the confidence one has in the theory justifying the application.

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CHAPTER 1

INTRODUCTION TO THE STUDY

Overview

This report is the second in a sequence of four publications associated with a three-year longitudinal study of the influence of parental significant others on educational and occupational expectations of high school youth. The first report (Hotchkiss, 1979a, in press) is a text describing the linear differential equation model which undergirds the theory, conceptualization, and data analysis associated with the study. The present report is an interim document serving two purposes: a) describe the progress of the study through the first panel of data collection, and b) evaluate alternative statistical methodologies for application to systems with causal feedback such as the system of career-expectation variables in this study. The focus is methodological rather than substantive. The third report will contain analyses of the first two panels of data, and the last report of the project will assess the forecasting accuracy of the differential equation model by comparing panel three data to forecasts generated from the pooled data of panel one and panel two.

Theoretical Rationale for the Study

Much evidence has accumulated to show that one's educational and occupational attainments depend, in part, on the status of one's parents and on mental ability (measured IQ) (Blau and Duncan, 1967; Sewell and Shah, 1967; Bendix and Lipset, 1959; Warner, 1963; Hollingshead, 1959; Rogoff, 1966; Lane, 1975; Kahl, 1957; Hauser, et al., 1975a; Hauser, et al., 1975b; Hauser and Featherman, 1977; and Sewell and Hauser, 1975). In recent years, these observations have been expanded; many scholars have focused attention on study of career-decision variables that interverr between background variables (such as family status or mental ability) and career attainments (Sewell, Haller and Portes, 1969; Sewell, Haller and Ohlendorf, 1970; Sewell and Hauser, 1975; Alexander and Eckland, 1975; Alexander, Eckland and Griffin, 1975; Porter, 1974; Wilson and Portes, 1975). This line of research operates within a framework frequently termed the "Wisconsin model" of status attainment (Haller and Portes, 1973). Empirical results generated within the framework of the Wisconsin model indicate tha. occupational and educational plans of youth are strongly related to occupat.onal and educational attainments achieved when the youth become adults. Also, the data suggest that persons such as peers and parents (i.e., "significant

others") exercise a strong influence on the career plans of youth;[1] correlations between youths' career plans and the expectations held for the youth by their significant others frequently exceed .65 (Haller and Woelfel, 1971; Kerckhoff, 1971; Kerckhoff and Huff, 1974; Williams, 1972; Curry, et al., 1976; and Curry, et al., 1978).

Problems in Existing Research

Past research has performed a valuable service in helping to identify some of the important variables that affect career-decision making. An important discrepancy remains between empirical work and theoretical conceptions of the career-decision making process, however. In theory, career-decision making is a developmental process in which career plans are continuously adjusted to changing inputs over time (Ginzberg, et al., 1951; Super, 1953; Super, 1957; Blau, et al., 1956; Tiedeman and O'Hara, 1963; Dudley and Tiedeman, 1977; and Picou, Curry and Hotchkiss, 1976). Empirical work, on the other hand, is mostly cross-sectional; hence, the data cannot fully reflect the dynamic nature of the theory.[2] Two specific questions that have not been adequately answered in the past can be addressed with appropriate longitudinal data: (1) To what extent does causal feedback operate among career-decision making variables? In the past, most empirical work has been carried out under the assumption that no feedback occurs. (2) Can career-decision making theory withstand a rigorous empirical test based on theoretical predictions (forecasts) that are made without benefit of hindsight? Both of these questions require further discussion; the following paragraphs, therefore, consider each issue in turn.

Causal feedback effects. One of the major shortcomings of cross-sectional analysis is that the direction of cause and effect cannot be investigated empirically.[3] For example, Curry and associates (1976)

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[1]Significant others are persons who are important to the individual and help define his/her definition of self and his/her views of the social and nonsocial environment.

[2]See Coleman (1968) on the relationship between cross-sectional regression coefficients and dynamic "change coefficients." Coleman shows that under certain assumptions the cross-sectional regression coefficients are an indeterminant ratio of the change coefficients, given that the system is in equilibrium, i.e., no longer changing.

[3]Econometricians (e.g., Goldberger, 1964) have developed numerous statistical techniques for estimating two-directional effects. But the required assumptions are frequently at least as difficult to justify a priori as assumptions needed for estimating two-directional effects with ordinary least squares. (See Chapter 4 of this report.) Also, the equilibrium assumption is required for estimating two-directional effects irrespective of the statistical estimation technique (Hout and Morgan, 1975).

observed a cross-sectional correlation of .766 between educational plans of white males and parents' educational expectations (as reported by parents) for their sons; this correlation was only slightly reduced when statistical controls for antecedent variables were applied. It is generally assumed in the literature that parents' expectations affect the plans of their children rather than the reverse (e.g., Hauser, 1972; Sewell and Hauser, 1972. See, also, many of the previous citations). It is likely, however, that at least part of the correlation is due to an effect in the opposite direction. Even if parents had little influence on their progenys' educational plans, the parents would likely be informed of those plans and report the information when asked to indicate educational expectations for their son or daughter on a survey. This plausible scenario would certainly generate agreement between parents' expectations and childrens' plans that is not due to influence of the parents on their children.

Inability to separate cause from effect is of more than purely theoretical concern. It is tempting to base strong policy recommendations on results such as reported by Curry and associates (1976; 1978); the relationship is quite strong, and it is assumed that significant-other variables affect students' career plans rather than the reverse. If this assumption is wrong, however, a considerable amount of money could be wasted on poorly informed policy. For example, expenditures intended to involve parents in school career guidance programs might not have the intended effects if the correlation between children's career plans and parents' expectations for their children is primarily due to parent-child agreement rather than to influence of the parents.

Prediction. In the most restricted meaning of the term, prediction denotes a forecast of an outcome before observing the outcome. With this definition, except in rare cross-validation studies, regression analysis (or path analysis) does not involve prediction. The "predicted values" of the dependent variable cannot be found until the regression coefficients have been calculated, but it is necessary to know all values of the dependent variable before the regression coefficients can be calculated; hence, values of the dependent variable have not been forecast prior to observing them. Even in longitudinal research prediction is rare, since the last set of observations normally is used in the calculation of the regression (or path) coefficients. In fact, econometric methods not withstanding, most statistical analyses still rely on ordinary least squares (OLS). OLS selects regression weights post facto to minimize the errors of estimation; hence, it is not surprising that good to modest accuracy is achieved.

None of the empirical study of the Wisconsin model has involved theory tests based on prediction as defined by forecasting. Since accurate prediction is more difficult to achieve than accurate a posteriori estimation as carried out in most regression settings (Malinvaud, 1966), the

Wisconsin model has not yet been subjected to the most rigorous tests available.[4]

Strategy of the Study

It is planned to collect data from the same sample of high school students and their parents at three different points in time, spread across the last three years of high school. While some extant data sets do contain information collected at more than one time point during the respondents'; high school years (e.g., Rehberg's data collected in upstate New York [Rehberg and Rosenthal, 1978]; the Canadian data set used by Williams [1972]; The Youth in Transition data set collected by Bachman [1970]), the present data set will be the first to contain longitudinal information about parents' career expectations for their children collected from the parents. Since cross-sectional relationships tend to be higher when parents' career expectations for their children are collected from the parents than when the information is collected from the children (see, e.g., Curry, et al., 1976), this is an important feature of the study.

The data from the third time point increases the value of the first two surveys many times; the parameters of the model estimated from the first two waves of data can be used to project values on all dependent variables for each respondent to the third time point, prior to gathering data at the third time point. Thus, a prediction study in the restricted meaning involving forecasts is envisioned.

Since career-decision making is generally considered to be a continuous process, a continuous-time mathematical model of the process using simultaneous differential equations will be specified carefully (see Hotchkiss [1979a], in press). This specification will provide a rationale, seldom explicit in the literature, for the statistical analyses. The rationale is based on hypotheses about the relationships among the variables as the system operates between measurement points. Parameters of the

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[4]In a personal communication to the authors based on a review of this document, Jon Cunnyngham noted an interesting distinction between prediction and forecast. According to this distinction, a forecast describes a future state without any qualifiers, while a prediction describes a future state given certain assumptions about the constancy of exogenous variables. As such, prediction is a more theoretical exercise than forecasting. This distinction suggests interesting issues about the nature of the connection between theoretical and practical science that lie outside the scope of this report. It should be emphasized, however, that use of the term forecast in the present report serves the primary purpose of emphasizing the difference between post facto "predictions" based on regression estimation and prediction of future states. In the present context, the term forecast encompasses both prediction and forecast as defined by Cunnyngham.

continuous-time model can be estimated from a cross-lagged path analysis (Coleman, 1968; Doreian and Humman, 1976; 1977). These parameters can then be used to forecast values for all dependent variables and all respondents to any point along a continuous time scale. The main advantages of conceptualizing the process with continous mathematics are associated with the fact that the continuous model can be used to calculate predictions over time intervals that do not match the length of the interval used to calculate the cross-lagged path coefficients. For example, the length of the interval between the first and second time points need not match the length of the interval between the second and third time points. Also, the continuous-time parameters permit ready comparison between different samples for which the data collection points do not necessarily match. For example, using data collected during the Junior year and again during the Senior year, one can project means and covariances backwards to the Freshman year; these can be compared to means and covariances for the same variables in other data sets containing data collected in the Freshman year. Also, cross-validation studies can be carried out using two measurement points that are not necessarily spaced the same distance apart as the measurements used in the original study.

The constant change coefficients of the differential equation model can be referenced to assess the hypothesis of feedback loops. These parameters of the differential-equation model are probably preferable to the cross-lagged path coefficients, because the change coefficients remain fixed irrespective of the length of the time interval between panels; whereas, the model predicts that the cross-lagged path coefficients vary in a complex way according to the length of the measurement interval (see Hotchkiss [1979a], in press or Doreian and Hummon [1974; 1976]).

Objectives of the Study

There are three objectives of the research; these are listed below.

1. To improve understanding of the career-decision making process among youth by investigating possible two-directional effects among important variables.

2. To strengthen the empirical foundation of career-decision making theory by submitting a specific model to a strong predictive test.

3. To increase the articulation between theory and technical procedures by illustrating the use of a dynamic mathematical model to (a) formulate theory reflecting the viewpoint that career choices are developed over time in a continuous process, and (b) guide empirical testing of theory.

These objectives flow naturally from the two questions posed in the preceding section. To recapitulate, these questions are: (1) To what

extent do casual feedback effects operate among career-decision making variables? (2) Can theory of the process by which career expectations develop withstand a rigorous empirical test based on theoretical forecasts of career expectation variables? The first two objectives are expressed as direct translations of these two questions into objectives. The third objective is an immediate outcome of using a model explicitly incorporating change over time to represent dynamic theory. Super has written

> Vocational preferences and competencies...change with time and experience, making choice and adjustment a continuous process (Super, et al., 1957: 89).

In contrast, current structural-equation models of educational and occupational expectations do not incorporate change over time. Use of a differential-equation model to state and test theory represents a first step toward closing this gap between theory and research.

The remainder of the report divides into two major parts. Chapter 2 and Chapter 3 comprise one section; they describe the progress of the study to date. Chapter 2 contains descriptions of data collection procedures and operational definitions of all variables used in empirical analyses presented in Chapter 3. Chapter 3 reports empirical results from panel one of the study. No contribution to the substantive literature is intended. Instead, the representativeness of the sample is evaluated. The second part is contained in Chapter 4; it presents a mathematical analysis of the identification issues in structural equations containing feedback loops. Although the two parts could be self-contained, substantive theoretical issues encountered in the cross-sectional path analysis of Chapter 3 serve to motivate the mathematical investigation of Chapter 4.

CHAPTER 2

METHODOLOGY

This chapter is divided into five sections. The first section describes the sampling procedures. Section two describes methods of data collection. Section three deals with data coding. The fourth section gives operational definitions for all variables used in the present report. Finally, section five touches briefly on statistical methods, but the main discussion of the statistical methodology appears in Chapter 4.

Sample

The sample is balanced by race (blacks and whites only) and sex, thus permitting race-sex specific analyses to be carried out. Approximately 170 individuals within each race-sex group are included. Table 1 displays the exact sample size for each of the four subsamples. The population from which the sample is drawn includes all sophomores in public high schools in Columbus, Ohio for the 1978-79 school year. It was decided to begin the data collection with sophomores to insure that the last wave of the survey will be carried out while respondents are in the very important last year of high school.

TABLE 1

SAMPLE SIZE BY RACE AND SEX, PANEL 1

	Race		
Sex	Black	White	Total
Female	187	177	364
Male	172	178	350
TOTAL	359	355	714

While a regional or national sample would be preferable to the local sample, past experience has shown that local samples do provide usable results. The type of analysis proposed here has been carried out on a Fort Wayne, Indiana sample (Kerckhoff, 1971), a small Wisconsin city sample (Haller and Woelfel, 1971), a Binghamton, New York sample (Rehberg and Rosenthal, 1978), and a Columbus, Ohio sample (Curry, et al., 1976) with results that do not differ markedly from reports based on national samples. While no local sample can be used to make precise generalizations to the entire nation, it does appear that a Columbus sample can be used with reasonable confidence to provide an approximation.

An official roster of all sophomores in Columbus public schools was secured from the Columbus Board of Education. Names were drawn from this list within race and sex categories at random. As it turned out, the master list was not current so that an oversampling of approximately three to one was necessary in order to secure the target number of respondents. This fact may have biased the sample somewhat against families who change address frequently. If so, the unrepresentative nature of the sample should be partially compensated by relatively low rates of attrition for panel two and panel three.

Table 2 presents a percentage breakdown of respondents originally drawn to be part of the study. Percentages are shown according to the reasons for nonparticipation. The first column of percentages are calculated as the percent of participants plus nonparticipants, and the second column shows percentages of nonparticipants. By far the largest category of nonparticipants is comprised of families who could not be contacted by interviewers. The reasons for failure to contact cannot be determined definitely, but inaccurate telephone numbers is the most immediate cause. Inaccurate numbers could be due to families moving, changed numbers, or mistakes in the records. Although refusals constitute the second largest category of nonparticipants, the percentage of the total number of students selected who refused is not high, twenty percent. Ineligible youth comprise the next largest group of nonrespondents. Ineligible youth include those who were not in school at the time of contact, those who were not first-year high school students, and students with learning disabilities. The residual category of nonparticipants includes cases for which one or more prospective respondents repeatedly failed to keep appointments for home visits by the interviewer, and interviews that were terminated by the interviewer or the respondents.

Data Collection Procedures

Interviewers were hired to hand carry self-administered questionnaires to respondents' homes.[5] Interviewers made telephone contacts with the

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[5]A more thorough description of data collection and coding procedures is contained in Appendix B.

TABLE 2

DISPOSITION OF STUDENTS DRAWN FROM THE SAMPLE FRAME TO BE PART OF THE STUDY

Disposition	Percentage of Total	Percentage of Nonparticipants
No contact made with family	33.9%	51.1%
Family refused	19.8	29.9
Student not eligible	9.6	14.6
Other nonparticipant	2.9	4.4
Family participated	33.8	—
Total	100.0	100.0
	(N=2115)	(N=1401)

mother or female guardian, in most cases, to gain verbal agreement to participate in the study and set an appointment when all respondents would be available together in the home. The interviewer then called on the family at the appointed time with questionnaires for each respondent member of the family--normally the sophomore youth, his/her mother and father. No youth participated unless at least one parent also participated.

Interviewers remained in the home until all respondents completed their questionnaires. During the home visit, interviewers were responsible for 1) clarifying instructions on the questionnaires, 2) requesting signatures on a respondent consent form and a pay form, 3) checking questionnaires for completeness after respondents were finished, and 4) editing completed questionnaires for usable occupational information. Each respondent family was paid ten dollars in return for participation; it was for this reason that pay forms had to be signed in respondent homes. Upon completion of the home visit, interviewers returned all materials to the field-site headquarters.

The management of the field operation was done jointly by project staff and a local survey firm, Appropriate Solutions, Incorporated (ASI). Interviewers were recruited from the interviewer roster of ASI and through an open publicity campaign. Interviewers with no experience were given one four-hour training session, and all interviewers were given a four-hour briefing session informing them of the procedures specific to the study.

In addition to the home visit, a scholastic aptitude test was administered to each student in his/her high school (see below). Arrangements for this administration were made through the local school board, but the administration was carried out by project staff.

Data Coding and Quality Checks

Nine college students were hired to code questionnaire responses into numeric scores (see footnote 5). The numeric scores were transferred to a specially designed coding form in preparation for keypunching. Most of the coding was fairly routine and needs little explanation here. A ten-percent quality check by permanent staff supervisors was conducted routinely. One member of the project staff assumed primary responsibility for coder supervision and management. Coders worked under continual supervision of the coding supervisor.

Two aspects of coding require some explanation. The data set contains subjective probabilities for a list of 93 occupation categories, 12 income ranges, nine schooling levels, and several categories of vocational training, as described in the section on definitions of variables. Respondents placed checkmarks on continuous lines to indicate their judgments about the chance of entering each occupation, completing each schooling level, etc. These checks were measured on a one-hundred point scale with a specially constructed ruler, to permit empirical analysis of the maximum degree of precision obtainable from respondents.

Occupational coding is the second important type of operation requiring special explanation. Several questions in the surveys requested respondents to name an occupation and list the duties. For example, parents were asked to name their current occupations, and youth were asked for occupational aspirations and expectations. All these responses were coded into 1970 three-digit census codes. After some trial and error, census procedures for occupational coding were adopted, and three coders were selected on merit to specialize in occupational coding. The occupational coding was monitored carefully during the early stages to assure agreement between the coding supervisor, project director and coders. Standard ten-percent quality checks were maintained throughout, and an error rate of less than one percent per variable was found.[6]

After coding was completed and the data were keypunched, a new group of student coders was hired to assist in checking accuracy. A computer program was written to check each variable on each case f r numerical values beyond the valid range of the variables. The student workers corrected values found to be out of range by the computer program. Also, all variables were checked for coding accuracy on six percent of the sample.

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[6]These error rates were calculated by dividing the total number of errors found by the total number of variables checked.

The error rate was found to be about one percent per variable (see footnote 6).

Definitions of Variables

A total of 23 variables is used in this report. All variables except measured mental ability were measured by questionnaires administered as described earlier. The questionnaires are contained in Appendix A. This section describes each of the 23 variables, referencing the questionnaire item(s) used to construct each variable.

A mnemonic abbreviation is associated with most of the variables. To provide a quick reference, the mnemonic for each variable is listed below, accompanied by a brief definition. More complete definitions and presentation of operational procedures are given in later paragraphs. The 23 variables used in this report are:

1. SES-- parental socioeconomic status
2. MA-- measured mental ability
3. AP-- academic performance of the youth
4. PSOE-- perceived significant-other variable for education
5. EEP-- educational expectation of parents for their child, measured by closed-ended multiple-response item
6. OEP-- occupational expectation of parents for their child, measured by the Occupational Aspiration Scale
7. EE-- educational expectation of youth, measured by closed-ended, multiple-response item
8. OE-- occupational expectation of youth, measured by open-ended occupation question
9. EEPsp- educational expectation of parents for their child, measured by subjective probability
10. OEPsp- occupational expectation of parents for their child, measured by subjective probability
11. EEsp-- educational expectation of youth, measured by subjective probability
12. OEsp-- occupational expectation of youth, measured by subjective probability

13. OEoas- occupational expectation of youth, measured by the OAS

14. MHSed- mother's high school graduation

15. FHSed- father's high school graduation

16. FT-- family type (intact-broken)

17. AGEhh- age of the head of the household

18. RACE-- race of the student

19. SEX-- sex of the student

20. FO-- father's occupational status

21. FE-- father's education

22. ME-- mother's education

23. FI-- family income

The remaining paragraphs of this section contain full definitions and description of operational procedures used to generate numerical values for each of the above variables. In these definitions, the term data-present average is used. Data-present average means to calculate the arithmetic mean of all values not coded as missing data.

SES stands for socioeconomic status of the youth's parents. It was calculated as a data-present average of the standard scores for father's occupational status (FO), mother's education (ME), and father's education (FE). (See variables 20, 21, and 22). Standard scores rather than raw scores were used to adjust for differences of metric between education and occupation. The primary data source for determining father's occupation, mother's education, and father's education is the mother's or father's report. When parent's report was missing, the youth's report on the parent was substituted. The occupational question for the father is form 6, question 11. The educational question of the mother and father is form 4 and 6, respectively, question 5. The youth's report of father's occupation was taken from form 2, question 7. The youth's report of mother's and father's education was recorded in form 2, question 4. All open-ended occupational data were coded to three-digit 1970 census codes and then translated into Duncan SEI codes by reference to Appendix B in Hauser and Featherman (1977).

MA denotes measured mental ability. It was measured by the Thurstone Test of Mental Alertness in a special administration in each student's high school. The Thurstone Test generates three scores, a verbal, quantitative, and total score (Scientific Research Associates, 1978; Buros, 1972). The total score was used to define MA. Unfortunately, due to the fact that the

tests were administered in late spring of 1979, the school year ended before all make-up sessions could be completed. As a consequence, there is a substantial quantity of missing data for MA: 120 out of 187 (64.2%) of the black females took the test, 126 of 177 (71.2%) white females, 107 of 172 (62.2%) black males, and 112 of 178 (62.9%) white males took the test. Current plans are to attempt make-up sessions this school year and adjust the scores of the students who take make-up tests to reflect age differences of those taking the test at different times. The Thurstone Test was selected primarily because it requires a short period to take, 20 minutes. The short administration time facilitated scheduling.

AP stands for academic performance. The measure used in this report is derived from students' responses to a question about how good a student they felt they were (form 2, question 49). Responses were converted to a four-point scale equivalent (with a maximum of 4 and minimum of 0). It should be emphasized that the operational definition of AP used here involves the concept of academic self concept; it is not a self-report estimating the calculated grade-point average. Also, the question refers to major subjects, thus excluding by implication courses such as music, art, and physical education.

PSOE stands for perceived significant-other variable for education. The term perceived is a bit of a misnomer; it refers to information about significant others reported (perceived) by ego (in this case ego refers to the youth). The term "objective" is used in this document to mean information about significant others as reported by the significant other. PSOE was formed as a data-present average of the youth's report of mother's and father's encouragement to attend college (form 2, question 38) and of the youth's estimate of the percentage of his/her peers planning to attend college (form 2, question 45). The three variables over which the average was calculated were converted to standard scores prior to averaging in order to adjust for differing metrics.

EEP stands for educational expectation of the parents for their child. It is defined as the data-present average of mother's and father's educational expectation of the youth, as reported on form 4 and form 6, question 27. The scale is a close approximation to the number of years of schooling the parents expect their child to complete. The highest levels of education do not conform to number of years of formal schooling, however. It should be noted that all education variables refer only to nonvocational schooling.

OEP stands for occupational expectation the parents hold for their child. This variable is defined by a data-present average of a modified version of The Occupational Aspiration Scale (OAS). The modified OAS asks the parents questions about their child rather than about themselves as in the original OAS (see forms 4 and 6, questions 41 through 48). Scoring of the OAS reflects occupational prestige (see Haller and Miller, 1971). The scores were calculated as data-present averages across the eight OAS items and then multiplied by 8. This procedure was followed to maintain the

metric of the OAS while avoiding the implicit assumption that missing data contains information about occupational aspiration.

EE stands for educational expectation of the youth. It is measured by the youth's response to question 14, form 2, and is exactly analagous to the measurement of EEP.

OE refers to the occupational expectation of the youth. It is measured by an open-ended question about the youth's expected future job. The response was translated into three-digit 1970 census occupation codes and then into a Duncan SEI score. OE, thus, measures the status of the youth's occupational expectation. (See form 2, question 18(1).)

The next four variables are based on subjective probability measurements; they represent alternate forms of the expectation variables EEP, OEP, EE, and OE. Since the four variables based on subjective probabilities share basic procedures, an account of the operations is given prior to defining each specific variable. Respondents were asked to indicate their subjective judgment of the chance they would enter each of 93 occupational groups and each nonvocational schooling level from tenth grade through doctorate degree (see forms 1, 3, and 6, questions 2 and 4). It is assumed that the occupations form a mutually exclusive, exhaustive list of occupations and that the educational levels are mutually exclusive and exhaustive of the highest level of "regular" schooling. Respondents indicated subjective probabilities by placing a checkmark on a number line beside each response alternative. The number line was marked off in units from zero to 100. Checkmarks were transformed to numbers by measuring the distance of the check from the origin, as described in the section on coding procedures. For each respondent and each variable, the numeric values of subjective probabilities were normed so that they add to 1.0, thus converting responses to legitimate probability scores. the norming is justified by the assumption that occupational and educational categories are mutually exclusive and exhaustive. That the norming can be justified is one of the useful features of the subjective probabilities. Frequently, respondents are asked to indicate responses of the type "very low" to "very high," leaving the metric for each respondent to define subjectively. The norming operation converts to a standard metric across respondents.

The educational and occupational expectation variables based on subjective probabilities are defined by the sum of products of the subjective probabilities with the scale values of education or occupation. Suppose y_j is the scale value for education (e.g., 10 indicating tenth grade) or for occupation (e.g., the Duncan SEI for lawyer). Denote the subjective probability of respondent i for response alternative j by p_{ij}, and assume there are J educational or occupational levels. The score for respondent i for educational or occupational expectation is then defined by

$$x_i = \sum_{j}^{J} p_{ij} y_j .$$

where x_i is the score for respondent i. Note that this is an expected value as defined in statistics. For more complete discussion of this procedure and its relationship to theory of forming career expectations, see Hotchkiss (1979b).

EEPsp is the parents' educational expectation of their child based on subjective probability. It is a data-present average of mother's and father's educational expectation of the youth based on subjective probability. There are nine values of y--10 for tenth grade through 18 for Ph.D. or professional degree. (See forms 3 and 5, question 4.)

OEPsp is the parents' occupational expectation of their child based on subjective probability. It is a data-present average of mother's and father's occupational expectation of the youth based on subjective probability. There are 93 values of y for the occupation variables. Each occupation on the list represents one or more of the occupations contained in the three-digit 1970 census categories. Duncan SEI scores were assigned to each occupation group by averaging Duncan SEI's associated with census categories represented by each occupation group. Due to an oversight, a few of the three-digit census categories are not represented in the question. Strictly speaking therefore, the assumption of exhaustiveness is not met, but it was assumed that the violation is not serious. Also, the assumption of mutual exclusivity of the occupation groups was violated in one instance because the stimulus "engineer" appears once in isolation and once in a group of technical occupations. A correction for this error was carried out by subtracting each respondents' subjective probability for engineer from the subjective probability for the second category including engineer and other occupations. This difference is treated as the subjective probability of entry into the nonengineering occupations listed in the category including engineers and other occupations. If the difference were negative, it was set to zero. (See forms 3 and 5, question 2.)

EEsp stands for educational expectation of youth based on subjective probability. It is the youth's expectation for self; otherwise, it is defined in the same manner as the educational expectation based on subjective probability of each parent for the youth. (See form 1, question 4.)

OEsp stands for occupational expectation of youth based on subjective probability. It is the youth's expectation for self; otherwise, it is defined just as is each parent's occupational expectation of the youth based on subjective probability (see form 1, question 2).

OEoas is the youth's occupational expectation for self derived from the Occupational Aspiration Scale (OAS, form 2, questions 28 through 35). Standard scoring procedures for the OAS are used (see Haller and Miller, 1971: 113), except that a data-present average was calculated and multiplied by 8 to maintain the metric of the OAS but avoid use of missing-data codes as legitimate data.

MHSed is a dichotomous variable indicating whether the mother completed high school. It is defined by mother's education as described under SES. The cut point for high school graduation was between scores of 12 and 13. When mother's report was missing, student's report was substituted. (See the description under SES.)

FHSed is a dichotomous variable indicating whether the father completed high school. It is defined just as is MHSed, except it refers to father instead of mother.

FT means family type; it has two categories, intact and nonintact. Measurement is derived from the mother's report, form 4, question 4. Response 1 "now married" was considered to indicate an intact family, and all other responses indicate nonintact. If the mother's response was missing, father's report on the same item was substituted.

AGEhh stands for age of the head of the household. For intact households, this was assumed to be the father's age (see form 6, question 3); otherwise, the mother's age was taken (form 4, question 3).

RACE stands for the race of the youth. The primary data source for RACE was item 2, form 2. This response was checked against the records on the school roster used to define the population. Discrepant cases were determined by asking interviewers to state the race of the student.

SEX stands for the sex of the youth. The primary data source for SEX was item [illegible] form 2. Accuracy of sex codes was checked in the same way those for race were checked.

FO stands for father's occupational status. The primary data source for father's occupation was the father's report (form 6, question 11). When the father's report was missing, youth's report of his/her father's occupation was substituted (form 2, question 7). The occupations were converted to three-digit 1970 census codes, then to Duncan SEI scores by reference to Appendix B in Hauser and Featherman (1977).

FE stands for father's educational achievement. The primary data source is father's report (form 6, question 5), but the youth's report of father's education was substituted when the father's report was missing (form 2, question 4). The education questions are closed-ended with scores reflecting the number of years of regular (nonvocational) schooling completed--except that graduate and professional degrees were not scored by the number of years it took to complete them. (See the referenced questionnaire item.)

ME stands for mother's education. It was operationalized exactly like FE except that all references are to mother instead of to father. (See form 4, question 5 for mother's report, and form 2, question 4 for youth's report).

FI denotes family income. It was measured as a data-present average of mother's and father's report (forms 4 and 6, respectively, question 19). When both parents' reports were missing, youth's report was substituted (form 2, question 10). The closed-ended income questions each contain 12 response alternatives (see referenced question). The responses were converted to income figures by using the midpoint of the income intervals. For the open-top interval, 50,000 dollars was used.

In recent publications related to status attainment it is unusual to find aggregate measures of SES. There are several reasons why the aggregate measure is preferable for this report to separate study of the SES components. First, the aggregate variable is more parsimonious than separate variables. Fewer coefficients must be examined, and sampling accuracy is higher because fewer degrees of freedom are lost than when SES components are studied separately. The purposes at hand are not to investigate the relative importance of the different components on career expectations. Past experience indicates that the magnitude of path coefficients not involving SES variables is little changed by disaggregation of SES into its components (Curry, et al., 1978). Finally, the SES components are intercorrelated to a modest degree, thus studying separate SES components introduces collinearity into the matrix of correlations among regressors, thereby, increasing sampling error.

The aggregate parental significant other variables (e.g., EEP) can be justified on similar grounds. The educational and occupational expectations of the mother for her child are highly correlated with those of the father. Thus, disaggregation of mother's and father's career expectations of their child would produce multicollinearity. Secondly, disaggregation of parents' career expectations implies that analyses be confined to intact families in which both parents participated in the survey, thus substantially reducing sample size. This separate analysis may be of interest at some future time, but is not appropriate for this preliminary report. Finally, the parsimony of the aggregate parental expectation variables is appealing.

The use of the term expectation in this report deserves some comment. Generally, expectation is used here to indicate a realistic assessment of future outcomes rather than a hope. This usage follows closely that suggested by Kuvlesky and Bealer (1966) ~~but~~ departs from Haller's (1968) suggestion that expectation refers to significant others and aspiration refers to ego. When applied to the OAS, however, the term expectation does not fit very well. Careful examination of the OAS reveals that half of the items are realistic expectation items, and the other half are aspirations. The term expectation is applied nevertheless, to avoid confusion when comparing OAS variables to other occupational variables.

The operational definitions of occupational variables make it clear that all occupation variables measure socioeconomic components of occupations. Other content of occupations is ignored. This is a potentially serious shortcoming of sociological theory of occupational attainment, but it is one which this report is not designed to address. (See

Spaeth [1979] for a recent review of these issues and theoretical proposal regarding occupational dimensions.)

Statistical Methods

The main statistical methodology used in this report to address theoretical questions is structural equation analysis. The theoretical introduction to this report indicates numerous feedback effects in the model of developing career expectations. In the technical literature on structural equation models, a set of equations containing feedback effects is termed simultaneous structural equations. The standard result for simultaneous structural equations is that "ordinary least squares" (OLS) is inappropriate because it yields biased, inconsistent estimates of the population effect coefficients (Koopmans, Rubin, and Leipnik, 1950; Koopmans, 1953; Goldberger, 1964; Johnston, 1963; Goldberger, 1973; Fisher, 1976). The idea that OLS is never appropriate in simultaneous structural equation systems carries into the substantive literature, both in sociology (e.g., Hout and Morgan, 1975; Land, 1971; Henry and Hummon, 1971), and in economics-(e.g., Annable and Fruitman, 1976; Freeman, 1971).

Chapter 3 of this report contains selected recursive models (i.e., models without causal feedback) of the process of forming career expectations. These models are presented chiefly for comparison with past research. In Chapter 4, the recursive assumption is dropped, and a model is estimated reflecting the causal feedback posited in the theoretical discussion of Chapter 1. OLS is included among the procedures used to estimate parameters of equation systems containing feedback loops; OLS is used in full knowledge of the strong warnings in the technical literature against such usage. Because of the importance of the issues, Chapter 4 includes extensive technical discussion; that discussion is delayed until Chapter 4 so that it can be juxtaposed to the substantive topic.

The report also contains numerous statistical methods that are in such common use they need no special discussion here. They will be described as needed when they are applied.

A note on statistical terminology may help to clarify the subsequent pages. Sociological study of status attainment has drawn on two technical literatures, one termed path analysis in biology, and one termed structural equations in economics. Throughout the report, terminology from the two literatures is intermixed in a fairly loose fashion, but the reader should be aware that path coefficient and structural equation parameters have quite similar meanings; although the former generally refers to a standardized coefficient and the latter does not. Path-regression coefficient is sometimes used in the path-analysis literature to reference unstandardized coefficients.

In this report, all statistical analyses are carried out separately within race-sex subgroups. To permit comparisons of coefficients between

subgroups and between variables, standardized path regression coefficients are reported throughout (Hotchkiss, 1976). These coefficients are based on standardization of all variables to zero mean and unit variance in the total sample rather than within race-sex subgroups, so that standardization constants are fixed across race and sex.

CHAPTER 3

COMPARISONS BETWEEN THE PANEL-ONE DATA AND PREVIOUSLY PUBLISHED DATA

The main purpose of this chapter is to gauge the degree to which observations from the data collected during the present study are generalizable. Three main subsections contain the substantive material of the chapter. Section one compares means, standard deviations, and correlations of the present sample to results from two previous studies in Columbus. These comparisons are presented for a small set of career expectation variables, parental status, and mental ability. The second section compares two important cross-sectional path models calculated from the current data to the same models calculated from the two previous Columbus studies. The third section compares selected demographic variables in the sample to 1970 U.S. census data and to the most recent previous sample in Columbus. This analysis is comprised of univariate comparisons between the samples and the Census on demographic variables such as education, employment status, and age.

All these comparisons necessarily must be crude. The census data now are about ten years old; hence, differences between the sample and the census may be due to real change as well as to sampling error. The same comment also applies to comparisons between the current sample and previous Columbus samples, though with somewhat less emphasis, since the time elapsed between samples is less than the time between collection of 1970 census data and the current sample. In addition, differences among the data sources regarding sampling frame, data collection methods, and operational definitions render precise comparisons inadvisable. Consequently, statistical tests of significance must be interpreted with caution.

Comparison of Selected Means, Standard Deviations, and Correlations from the Current Sample to Results of Previous Columbus Samples

One of the advantages of conducting the study in Columbus is that two previous cross-sectional studies have been carried out measuring career expectation variables of high-school sophomores in Columbus public high schools (Curry, et al., 1976; Curry, et al., 1978). Several important variables in the two studies match or approximate the variables of the current study; hence, cross-sectional comparisons among the studies are feasible.

Brief descriptions of the previous Columbus samples will provide some basis for judging the comparability of the current data to past data. For more thorough descriptions see the publications by Curry and Associates cited above. In 1972 a sample of male sophomores balanced by race was asked for information regarding career expectations and related topics. A similar survey of females was conducted in 1974. The methodology of the two studies was kept constant in so far as feasible, in order to preserve comparability between sexes. In both studies, some 125 whites and 125 blacks were surveyed. The samples were stratified by high school as well as by race. Approximately equal numbers of respondents were drawn from each school. Students completed self-administered questionnaires in their high school buildings during regular class hours. Administration occurred in each school over a two-day period. Questionnaires for parents were carried home by students and returned by one of three routes: a) students returned parental questionnaires to their schools the next day and turned them in to staff members conducting the second session of questionnaire administration, or b) parents returned their questionnaires by mail, or c) parental questionnaires were picked up at respondents' homes. Most questionnaires were returned by students, and the bulk of those remaining were returned by mail (see Curry, et al., 1976 and Curry, et al., 1978).

In summary, other than the longitudinal character of the present study, there are two major differences between the previous two studies and the current work. First, the dates of the data collection for the previous studies are early and middle 1970's; whereas, the first panel of data in the present study was collected in early 1979. Secondly, in the present study, data were collected from students and both parents at a single sitting in respondents' homes. Questionnaires were completed under continuous monitoring of an interviewer. Data for the previous two studies were collected from students in their high schools and from parents in their homes. No interviewers monitored collection of parent data. Neither method is free of difficulties, and each has certain clear advantages, but the present purpose does not require discussion of the relative merits of the two methodologies. The differences simply are noted as possible sources of differences between results from the current study and the two previous studies.

Table 3 displays comparative statistics between the current and previous data for each of the four race-sex subgroups: black females, white females, black males, and white males. Means, standard deviations and correlations are compared on seven variables of central importance in this research. These seven variables are parental socioeconomic status (SES), measured mental ability (MA), academic performance (AP), educational expectation of parents for their child (EEP), occupational expectation of parents for their child (OEP), the youth's educational expectation for self (EE), and the youth's occupational expectation for self (OE).

Although the same mnemonic representation of these variables is used irrespective of whether reference is to the current or past data, some differences in operational definitions must be noted. Measured mental ability was measured with the Henmon-Nelson (Henmon and Nelson, 1942) test

TABLE 3

COMPARISONS OF MEANS, STANDARD DEVIATIONS, AND CORRELATIONS ON SEVEN VARIABLES FOR CURRENT SAMPLE TO PREVIOUS SAMPLES

Previous Sample		Current Sample								
		SES	MA	AP	EEP	OEP	EE	OE	Means	S.D.s
PANEL 1: Black Females	SES	--	.157	.032	.157	.113	.214	.114	-.198	.722
	MA	.248	--	.200	.234	.237	.305	.137	36.000†	11.436
	AP	.205	.392	--	.259	.257	.371	.283	2.384	.796
	EEP	.184	.226	.309	--	.480	.497	.355	14.345†	2.027
	OEP	.218	.228	.167	.607	--	.378	.237	45.967	8.810
	EE	.134	.090	.239	.596	.436	--	.298	14.305†	2.177
	OE	.164	.141	.124	.302	.305	.352	--	55.832	21.529
	Means	-.224	90.534†	2.272	16.260†	47.620	16.042†	56.705		N=187
	S.D.s	.706	10.306	.838	2.397	8.615	2.489	21.498	N=119	
PANEL 2: White Females	SES	--	.379	.303	.434	.343	.413	.198	.179	.873
	MA	.393	--	.491	.495	.391	.317	.259	49.691†	14.215
	AP	.269	.561	--	.437	.378	.436	.348	2.563	.864
	EEP	.509	.454	.340	--	.596	.688	.396	14.201†	2.013
	OEP	.180	.504	.299	.481	--	.462	.409	46.038*	8.205
	EE	.441	.468	.356	.705	.463	--	.383	14.186†	2.188
	OE	.183	.237	.139	.480	.233	.403	--	56.125	21.495
	Means	.066	101.276†	2.481	15.163†	44.161*	14.748†	53.009		N=177
	S.D.s	.841	12.074	.814	1.779	7.316	1.992	20.805	N=127	

† No significance test calculated due to noncomparable metrics between studies

* The means from the two samples are statistically significantly different at $p \leq .05$

TABLE 3--continued

Previous Sample		Current Sample: SES	MA	AP	EEP	OEP	EE	OE	Means	S.D.s
PANEL 3: Black Males	SES	--	.159	.152	.335	.327	.283	.284	-.175	.747
	MA	.339	--	.319	.201	.282	.170	.113	34.467†	12.762
	AP	.109	.402	--	.455	.379	.427	.354	2.193*	.748
	EEP	.347	.322	.463	--	.518	.565	.378	14.177†	2.053
	OEP	.287	.381	.345	.579	--	.497	.404	45.685	10.468
	EE	.275	.237	.315	.449	.304	--	.440	14.448†	2.103
	OE	.278	.170	.319	.523	.344	.424	--	52.451	24.350
	Means	-.172	89.25 †	1.731*	14.122†	44.095	15.552†	51.294		N=172
	S.D.s	.704	13.617	.828	1.555	9.947	2.458	26.056	N=117	
PANEL 4: White Males	SES	--	.356	.275	.448	.213	.483	.321	.122	.837
	MA	.461	--	.653	.543	.473	.508	.373	50.089†	15.401
	AP	.307	.510	--	.594	.466	.553	.381	2.225	.882
	EEP	.618	.584	.523	--	.686	.740	.559	13.884†	2.095
	OEP	.376	.486	.447	.681	--	.584	.506	44.063	11.266
	EE	.461	.522	.402	.765	.603	--	.576	13.899†	2.235
	OE	.419	.483	.219	.603	.454	.545	--	47.250	25.754
	Means	.250	102.120†	2.186	14.032†	44.291	15.291†	47.936		N=178
	S.D.s	.908	12.283	.865	1.523	9.279	2.406	26.523	N=134	

† No significance test calculated due to noncomparable metrics between studies

* The means from the two samples are statistically significantly different at $p \leq .05$

for the previous two studies, but the Thurstone Test of Mental Alertness (Scientific Research Associates, 1978; Buros, 1972) was used for the present study. Means and standard deviations of the two tests cannot be compared because of differing metrics. Academic performance for the previous studies was calculated from data obtained from school grade records. In the present study, academic performance is a self-report measure, as described in Chapter 2. The two measurements are four-point scales, however, so that rough comparisons are feasible.

SES in all three data sets is an average of standard scores for a) father's occupational status, b) father's education, and c) mother's education. Use of standard score units is responsible for means and standard deviations of SES being less than one in absolute value. In all three data sets, occuptional expectation of the youth is based on the youth's response to an open-ended question requesting he/she name the job he or she most expected to have as an adult. Father's occupation was also obtained via an open-ended question. Coding of open-ended occupations in the previous studies was done directly by methods given in Reiss (1961) by converting occupational titles to NORC scores and then to Duncan SEI scores. In the present work, all occupations were coded first into the 1970 detailed census codes and then converted to Duncan SEI by reference to Appendix B in Hauser and Featherman (1977). The final metric of father's occupation and youth's occupational expectation is comparable between studies, but the procedures for generating the Duncan SEI scores vary between studies. The parent's occupational expectation of their child is perfectly comparable between studies. In all cases it is the average of the mother's and father's Occupational Aspiration Scale (OAS) completed with reference to the son or daughter.

The education variables (mother's educational achievement, father's educational achievement, and youth's educational expectation) were measured by use of a closed-ended item with several response alternatives. The response alternatives in the current study correspond closely to the number of years of <u>regular</u> schooling (as opposed to vocational training). In the previous studies, the metric is somewhat different, including provision for vocational training after high school and excluding distinctions among freshmen, sophomore, and junior years of college. Hence, the education metric cannot be compared between the studies.

In summary, means and standard deviations are perfectly comparable between studies for occupational expectation of parents for child (OEP) and for the youth's occupational expectation for self (OE). Approximate comparison of means and standard deviations between studies are possible for SES and academic performance (AP). Comparisons of means or standard deviations for the remaining variables are not meaningful, however, due to differences of metric. Those variables for which such comparisons are not possible are MA, EEP, and EE. No tests of significance for differences between samples on the means for these variables were calculated.

Observing the univariate statistics, where the metrics are comparable between studies, means and standard deviations for the current data fairly closely match those of previous data. Out of all the comparisons only AP

for black males and OEP for white females reveal large enough differences between samples so that random sampling error can be ruled out as the likely reason for the difference. For OEP, the difference is still of small enough magnitude so that it is of little substantive significance, as opposed to statistical significance. The average AP for black males, however, is substantially higher in the current than in the previous data. This discrepancy might easily be due to the fact that the current data are reports of students estimating how good a student they believe themselves to be; whereas, the previous AP variable was calculated from school records.

Comparison of correlations above the diagonal (present study) to those below the diagonal (previous study) shows some discrepancies of moderate size, but correlations calculated between the entries above and below the diagonal do reveal approximate correspondence (r=.68, .74, .71, .75, respectively for black females, white females, black males, and white males). Differences between correlations of about .07 to .10 or less can be attributed to random sampling error,[7] and a substantial part of the observed discrepancies undoubtedly are due to random sampling variability. Nevertheless, too many differences exceed .10 to presume that all the variation is random. Differences in operational procedures undoubtedly account for a substantial portion of nonrandom differences. This hypothesis is particularly likely regarding AP. The self-report measure of the current sample correlates more highly with the expectation variables than does the calculated grade point average from the previous studies. Time trends may also account for some of the nonrandom discrepancies between studies. Observe that in the current data, the SES aggregate variable does not correlate as highly with other variables as in the previous data. This decline way be due in part to a time trend (see Hauser and Featherman, 1978). Nevertheless, the time-trend hypothesis is highly conjectural, and caution must be exercised interpreting calculations involving the SES measures. The most striking consistency between the data sets is that educational and occupational expectations of parents and of youth are highly intercorrelated and the exogenous variables, SES and MA, exhibit correlations of moderate size with the expectation variables.

In view of the differences in methodology and time interval separating the current study from past work, it is concluded that the data from the three studies display satisfactory degree of similarity, but it is important to note the differences regarding correlations including AP and SES.

The new measurement methodology based on subjective probabilities for assessing educational and occupational expectations has not been used in these comparisons because the previous studies made no use of the concept of subjective probability for measuring career expectations. The appropriate

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[7]The values of .07 and .10 were calculated from Fisher's z transformation using the average sample sizes across subgroups within studies. The (.10 .07) reflects different values of the true population correlation--.10 to .55 was used.

checks on comparability of course, must be based on measurements that are as similar between samples as possible. On the other hand, a useful assessment of the quality of the measurements based on subjective probability can be gained by repeating the above calculations with the subjective probability measurements substituted for the more traditional measurements. Table 4 displays these calculations; the top panel displays results for females, blacks above the diagonal, and whites below. The bottom panel repeats this format for males. These data should be compared to the corresponding data in Table 3.

Comparisons of correlations based on subjective probability measurements to those derived from traditional measurements reveal remarkably consistent results. For all four subgroups, irrespective of whether the comparison data are correlations from current or previous studies, the subjective probability measurements produce higher correlations than do the traditional methods. The higher correlations produced by the subjective probabilities are not distributed uniformly across all variable pairs, however. Correlations including one expectation variable and either SES, MA, or AP are approximately the same magnitude regardless of method of measuring the expectation variables. there is one exception to this observation: for black females, the subjective probability measurements generate higher correlations than traditional methods, by an average of about ten points. In contrast, all subgroups display higher correlations among expectation variables when expectations are measured by subjective probabilities than when other measurement methods are used. The average increment is some ten points.

Among the expectation variables, the largest increments in correlations are for occupational expectation variables. The already high correlations involving educational expectation variables have increased by a small amount, but the increments for occupation variables are dramatic in several cases. To illustrate, for black females the correlation between parental occupational expectation for daughter and the daughter's occupational expectation for herself has increased from .237 to .491, if the current sample is the base for comparison, or from .305 to .491 if the previous sample is the basis of comparison. For white females, the increment in the same correlation is from .409 to .692, if the comparison is to the previous sample. For black males, the same correlation (OEP, OE) increases from .404 to .515 or from .344 to .515, respectively, if the current or previous sample provides the comparison. Finally, for white males in the previous sample, the correlation between parental occupational expectation of their son and the son's occupational expectation for himself is .454, and the same correlation in the current sample using traditional measurements is .506. In contrast, when the subjective probability measurement is used, this correlation is .733.

To summarize, subjective probability measurements of expectation variables generate little change in correlations between expectation variables and other variables, except for black females where an average

TABLE 4

CORRELATION MATRICES, MEANS, AND STANDARD DEVIATIONS
WITH EXPECTATION VARIABLES BASED ON SUBJECTIVE PROBABILITIES

PANEL 1: Females

White Females	SES	MA	AP	EEPsp	OEPsp	EEsp	OEsp	Means	S.D.s
				Black Females					
SES	--	.157	.032	.206	.225	.243	.257	-.198	.722
MA	.379	--	.200	.288	.326	.231	.358	36.000	11.436
AP	.303	.491	--	.317	.374	.370	.373	2.384	.796
EEPsp	.435	.451	.426	--	.486	.594	.406	14.564	1.732
OEPsp	.333	.447	.427	.578	--	.391	.491	55.568	7.011
EEsp	.346	.324	.420	.655	.567	--	.603	14.841	1.915
OEsp	.123	.303	.361	.524	.692	.527	--	56.718	7.263
Means	.179	49.691	2.563	14.584	56.417	14.650	55.280		N=187
S.D.s	.873	14.215	.864	1.657	8.876	1.988	10.401	N=177	

PANEL 2: Males

White Males	SES	MA	AP	EEPsp	OEPsp	EEsp	OEsp	Means	S.D.s
				Black Males					
SES	--	.159	.152	.286	.304	.183	.187	-.175	.747
MA	.356	--	.319	.228	.264	.205	.338	34.467	12.762
AP	.275	.653	--	.357	.452	.403	.492	2.193	.748
EEPsp	.408	.429	.544	--	.604	.641	.456	14.423	1.737
OEPsp	.390	.531	.567	.783	--	.525	.515	51.244	9.073
EEsp	.431	.495	.555	.705	.670	--	.472	14.762	1.810
OEsp	.356	.527	.508	.651	.733	.666	--	51.674	9.755
Means	.122	50.089	2.225	14.202	50.232	14.880	48.390		N=172
S.D.s	.837	15.401	.882	1.885	13.098	2.115	13.639	N=178	

increment of about ten points is observed. For correlations among expectation variables, on the other hand, substantial increments in correlation are due to the subjective probability measurements. For occupational expectations, the increment is quite large, averaging about 25 points for the correlation between parental occupational expectation of youth and the youth's occupational expectation of self.

The data in Table 3 are based on parental occupational expectations of youth measured by the Occupational Aspiration Scale (OAS) and youth's occupational expectation measured by an open-ended question. This combination was chosen to maintain comparability with the previous studies. It would be useful, however, to compare correlations involving youth's occupational expectation based on subjective probabilities to correlations involving the OAS. Table 5 tabulates the correlations needed for these comparisons. Comparing these entries to the analogous entries in Table 3 and Table 4 shows that correlations based on youth's OAS are generally higher than when the open-ended occupational expectation is used. For both black females and white females, the subjective probability measurement reveals higher correlations than the OAS, but for males, the OAS correlations are nearly as high as those based on subjective probability measurement. It is possible that if the newly developed OAS alternate form for females had been used in place of the original OAS, that the correlations based on the OAS for the female samples would be as high as those based on subjective probability measurement (see Hotchkiss, et al., 1978).

TABLE 5

CORRELATIONS BETWEEN YOUTH'S OAS AND SIX OTHER VARIABLES

Variable	Black Females	White Females	Black Males	White Males
SES	.225	.262	.240	.381
MA	.353	.273	.428	.483
AP	.263	.354	.370	.513
EEP	.330	.492	.416	.685
OEP	.366	.391	.495	.651
EE	.406	.533	.511	.683
EEPsp	.313	.465	.457	.677
OEPsp	.407	.446	.438	.683
EEsp	.497	.561	.445	.683
OEsp	.558	.533	.588	.742

NOTE: Table entries are correlations between the OAS for the youth OEPoas and the variable listed in the left row margin.

The appropriate interpretation of these results is somewhat ambiguous, though the magnitude of correlations based on subjective probabilities is certainly encouraging. It would be useful to have some numerical index of the reliability of the subjective probability measurements, but it should be emphasized that the classical linear measurement model is not applicable to the substantive content of these data. A coefficient alpha or some comparable measure of internal consistency would yield no useful information (if interpreted in the usual manner) because the "true" score for different subjective probabilities is different.

This point is so important that it justifies some additional discussion. Consider the classical measurement model applied to the subjective probabilities:

$$p_{ij} = \rho_{ij} + \varepsilon_{ij}$$

where p_{ij} denotes the observed subjective probability for the ith person and the jth occupation (say), and ρ_{ij} is the true subjective probability. The ε_{ij} is the error of measurement for person i, occupation j. Now, if the true subjective probability were constant across occupations for each individual, then the several subjective probabilities would represent parallel measurements, and standard reliability coefficients based on the assumption of parallel measures would be appropriate. The idea of constant subjective probabilities across occupations is inappropriate, and, if true would render the data of little value. According to the theory underlying the subjective probability measurement, only youth who are completely undecided on an occupation have constant true-score subjective probabilities over occupations (see Hotchkiss, 1979b). Thus, the hypothesis of parallel measures for subjective probabilities is equivalent to the hypothesis of maximum indecision for every person. If the hypothesis should hold, then there would be no between-person variance (of true scores) in the status level of occupational expectation, due to the norming rule that subjective probabilities add to one. Hence, the reliability coefficient would be zero, it being defined as the ratio of true-score variance to total variance.

The increments of correlations due to the subjective probability measurements can be taken as indirect evidence that the subjective probability measurements increase the reliability over traditional measurements, since unreliability of measurement deflates correlations among observations. Also, status attainment theory indicates that the expectation variables are highly correlated; hence, the results may be interpreted as tentative support for the measurement method by virtue of construct validity. Further comparison of the subjective probabilities to the OAS measurements of occupational expectation is important, in view of the high correlations observed for both of these methods. In a future publication, it would be interesting to develop a structural equation model including multiple indicators of latent variables with the latent variables shown affecting each other.

Comparison of Two Path Models from the Current Sample to Results from the Previous Columbus Samples

Two cross-sectional path models were an important part of the previous research in Columbus. The first of these path models is based on a perceived significant-other variable for education (PSOE, see Chapter 2). This variable is defined as the average of the youth's report of mother's encouragement to attend college, father's encouragement to attend college, teacher's encouragement to attend college, and youth's perception of the proportion of his/her peers planning to attend college. This measure was based on the original Wisconsin publications (Sewell, Haller, and Portes, 1969 and Sewell, Haller, and Ohlendorf, 1970) and, hence, holds substantial interest. It should be noted however, that the perceived teacher's encouragement to attend college was part of the original PSOE but was not measured in the current study, so that perfect comparability among samples cannot be maintained.

For technical reasons having to do with correlations between independent variables and disturbances, the path models in the past Columbus research (as well as most status attainment work outside Columbus) were confined to recursive path analysis, meaning no feedback loops were permitted in the models. Since the main purpose of this section is to compare data from the current sample to data from the past work, the recursive assumption is retained, even though a strong theoretical element in this research project is that feedback loops do exist among the career expectation variables. Some very tentative analyses permitting feedback are presented in the chapter following this one.

The path model including the perceived significant other variable is diagramed in Figure 1. It is a fairly simple model showing the perceived significant other variable and academic performance intervening between the background variables (SES and MA) and the youths' career expectations (EE and OE). Table 6 displays the numerical values needed for comparisons between samples. Important broad similarities are evident in these comparisons. The perceived significant other variable for education (PSOE) exhibits a modest effect on youth's educational expectations (EE) in all samples, but in neither the current nor past samples does PSOE uniformly dominate the equation for educational expectation. When occupational expectation (OE) is the dependent variable, results are even more mixed; PSOE does not have a statistically significant effect on OE in all subsamples, though it does in most cases. Also, in all samples and each equation, the R-square values are small to moderate, but are substantially larger for educational expectation than for occupational expectation. Thus, the explanation of educational plans is more complete than the explanation of occupational plans. Judging from the correlation matrices, this imbalance might be remedied by reliance on the subjective probability measurements or the OAS for measurement of occupational expectation.

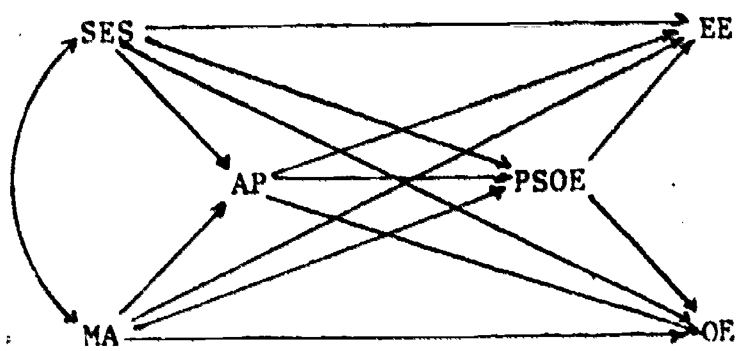

Figure 1. A model of educational and occupational expectations (EE, OE) including a perceived significant other variable for education (PSOE).

In addition to the broad similarities between the current and past data, there are some equations that exhibit close correspondence in specific detail between studies. In all subsamples measured mental ability (MA) exercises the dominant influence on academic performance; SES manifests little impact when MA ability is controlled. For black males, both the equation for educational expectation (EE) and occupational expectation (OE) exhibit close similarity between studies. The equation for EE for white females shows a marked similarity between studies, as does the equation for PSOE for white males.

On the other hand, there are numerous discrepancies between specific coefficients in one study and the analogous coefficient in the other study. The most important discrepancies of this type include the following: The R-square values for both educational and occupational expectation of black females (EE, OE) are higher in the new study than in the previous study. For white females the magnitude of effects of perceived significant-other influence (PSOE) and academic performance (AP) on occupational expectation reverses between samples; PSOE exhibits the larger effect in the previous work, and AP does in the present study. Also, for white females, the magnitude of effects of measured mental ability (MA) and academic performance on PSOE is reversed in the two studies, MA larger in the previous data and AP larger in the current data. For white males, a similar reversal of the magnitude of coefficients associated with MA and AP is evident in both the equation for EE and OE. Finally, for black males, the estimated effect of AP on PSOE is substantially stronger in the new data set than in the previous data. Many of these differences involve AP. In view of the difference between studies in measuring AP, it may be worth entertaining some substantive interpretation of these observations in a future publication.

Statistical tests of the differences between samples have not been presented due to the obvious differences between the studies that are not sampling error. Nevertheless, some estimate of the extent to which

TABLE 6

BETWEEN-SAMPLES COMPARISON OF A PATH MODEL
INCLUDING AN AGGREGATE PERCEIVED SIGNIFICANT-OTHER VARIABLE FOR EDUCATION

PANEL 1: Black Females

Sample	Dependent Variables	SES	MA	AP	PSOE	R^2
		Independent Variables				
Previous Sample	AP	.099	.431*			.150*
	PSOE	.111	.172	.157		.059
	EE	.087	-.031	.196*	.378*	.174*
	OE	.127	.110	.065	.021	.047
Current Sample	AP	.001	.250*			.040*
	PSOE	-.011	.094	.282*		.078*
	EE	.194*	.258*	.271*	.241*	.280*
	OE	.099	.067	.208*	.169*	.130*

PANEL 2: White Females

Sample	Dependent Variables	SES	MA	AP	PSOE	R^2
		Independent Variables				
Previous Sample	AP	.081	.609*			.389*
	PSOE	.336*	.516*	-.112		.398*
	EE	.114*	.067	.133	.424*	.461*
	OE	.0001	.055	.010	.296*	.135*
Current Sample	AP	.131*	.481*			.257*
	PSOE	.283*	-.110	.298*		.249*
	EE	.155*	.096	.185*	.434*	.391*
	OE	.048	.096	.227*	.064	.139*

* Significantly greater than zero at the .05 level of significance, one-tail test

TABLE 6--continued

PANEL 3: Black Males	Dependent Variables	SES	MA	AP	PSOE	R^2	
	AP	-.034	.384*			.162*	Previous Sample
	PSOE	.167	-.028	.087		.024	
	EE	.231*	.060	.272*	.264*	.228*	
	OE	.318*	-.043	.349*	.044	.165*	
	AP	.101	.318*			.112*	Current Sample
	PSOE	.234*	-.048	.252*		.098*	
	EE	.163*	.027	.345*	.297*	.322*	
	OE	.254*	-.032	.362*	.062	.183*	

PANEL 4: White Males	Dependent Variables	SES	MA	AP	PSOE	R^2	
	AP	.078	.49[illegible]*			.242*	Previous Sample
	PSOE	.240*	.362*	.110		.318*	
	EE	.141*	.215*	.119	.443*	.482*	
	OE	.159*	.340*	-.111	.377*	.376*	
	AP	.050	.654*			.429*	Current Sample
	PSOE	.255*	.318*	.062		.277*	
	EE	.246*	.052	.331*	.324*	.510*	
	OE	.132*	.057	.212*	.334*	.276*	

* Significantly greater than zero at the .05 level of significance, one-tail test

discrepancies among standardized path-regression coefficients are due to sampling error can be gained by examining standard errors of the coefficients. A complete table of standard errors is not necessary, but rough indication of the magnitude of the standard errors may be informative. For the current data, standard errors range from about .06 to .09. Due to somewhat smaller samples, standard errors for the previous studies are a bit larger; they range from about .07 to .11. Thus, the standard errors of differences between coefficients range approximately from .09 to .14; hence, the discrepancy between a coefficient in the current study and the corresponding coefficient in the previous work would have to be about .18 to .27 before obtaining statistical significance with a .05 alpha. From these figures it is evident that a substantial part of the differences between coefficients calculated from the two studies reasonably can be attributed to sampling variability.

In the previous Columbus studies, substitution of "objective" educational expectations of parents and separate measures of objective parental occupational expectation for PSOE led to path models more in line with the theory that significant-other influence is an important force intervening between background and career expectations of youth. Recall that the term objective in this context refers to parental expectations of their children measured by asking the parents for information, and perceived refers to information about parents, peers and others collected by asking ego for his/her perceptions.

For the comparisons, mother's and father's educational expectations were averaged to form a single significant-other variable--educational expectation of parents for ego (EEP). The analogous average was also formed for parental occupational expectation of ego (OEP). In the previous research a model was also examined in which the mother's and father's expectations were treated as distinct variables. Substantive questions concerning relative impact of mother and father that can be addressed by this disaggregation are quite important, but the present purpose is to assess roughly the comparability between samples. This purpose is served best by retaining the parsimony inherent in aggregating expectations of the mother with those of the father. (See the discussion in Chapter 2.) First, sampling variability is somewhat less with parental expectations aggregated, because fewer coefficients are estimated for each equation (fewer degrees of freedom lost). Secondly, there is no theoretically satisfactory solution for handling cases in which only one parent lives in the household, except to calculate separate models for intact and broken homes. At some future point, separate analyses of this sort should be carried out, but to do so for the comparisons here would unduely confound sampling variability with other differences between the studies, because of the small sample sizes required by the separate analyses.

Figure 2 shows a path diagram of the revised model, and Table 7 displays the data needed for the comparisons. As with the model including PSOE, data are arranged so that within each panel of the table, path matrices from the previous study appear above those from the current study. Generally, the coefficients from the two studies appear to show somewhat

smaller differences in this "objective" model than in the previous "perceived" model. Most of the differences between the two studies are associated with coefficients of academic performance (AP) on all the other dependent variables--educational expectation of parents for ego (EEP), occupational expectation of parents for ego (OEP), educational expectation of ego for self (EE), and occupational expectation of ego for self (OE). In view of the fact that AP is self reported in the present study and drawn from school records in the previous studies, these differences between studies cannot be attributed to sampling error.

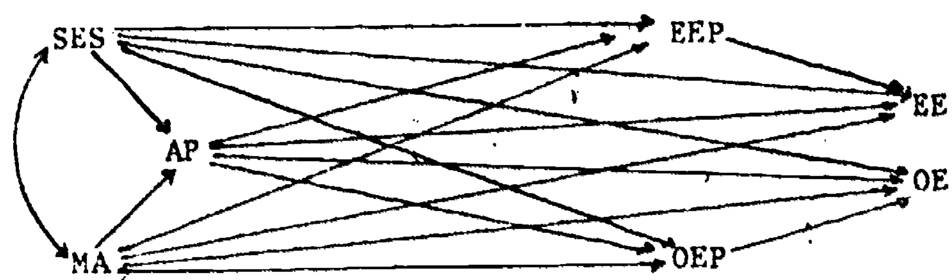

Figure 2. A model of educational and occupational expectation (EE, OE) containing "objective" significant-other variables (EEP, OEP).

As with the "perceived" model, certain broad similarities between the data from the two studies stand out. First, each sample shows moderate to high R-square in the equation for educational expectation (EE), and parental educational expectation (EEP) of the youth is the main independent variable. Secondly, R-square for occupational expectation (OE) is substantially less than for EE. Further, the importance of parental occupational expectation of ego (OEP) in affecting OE is not as clear cut as the effect of EEP on EE, although OEP generally has a stronger effect on OE than did PSOE (in the previous model). Finally, the effects of background on EEP and on OEP are uniformly small to moderate.

Since the occupational expectation variables measured by subjective probabilities show higher correlations than do the same variables measured by alternative methods, it is of some interest to repeat the calculations above substituting subjective probability measurements of expectation variables for the traditional methods. Table 8 displays the needed data by race and sex subgroups. In every equation in which occupational expectation is the dependent variable (OE), the effect of parental occupational expectation (OEP) is substantially greater using the subjective probability method than when other methods are used. This fact is reflected in substantial increases in R-squares for occupational expectation. These observations hold whether results of the subjective probability measures are compared to results of other methods from the current or past samples. On the other hand, the other equations in the model are not altered so much by use of subjective probabilities. Although the R-square in the equation for

TABLE 7

BETWEEN-SAMPLES COMPARISON OF A PATH MODEL WITH PARENTAL EDUCATIONAL AND OCCUPATIONAL EXPECTATIONS OF THEIR CHILDREN SUBSTITUTED FOR THE AGGREGATE PERCEIVED SIGNIFICANT-OTHER VARIABLE

PANEL 1: Black Females	Dependent Variables	SES	MA	AP	EEP	OEP	R^2	
	AP	.099	.431*				.150*	Previous Sample
	EEP	.106	.147	.280*			.085*	
	OEP	.214*	.235*	.04			.093*	
	EE	.031	-.049	.098	.561*		.437*	
	OE	.083	.065	.059		.205*	.092*	
	AP	.001	.250*				.040*	Current Sample
	EEP	.138*	.221*	.230*			.116*	
	OEP	.079	.214*	.207*			.108*	
	EE	.138*	.196*	.250*	.384*		.350*	
	OE	.085	.049	.222*		.161*	.118*	

PANEL 2: White Females	Dependent Variables	SES	MA	AP	EEP	OEP	R^2	
	AP	.081	.609*				.389*	Previous Sample
	EEP	.360*	.310*	.034			.388*	
	OEP	-.011	.479*	.009			.265*	
	EE	.053	.111	.066	.565*		.533*	
	OE	.101	.136	-.024		.148	.084*	
	AP	.131*	.481*				.257*	Current Sample
	EEP	.236*	.302*	.204*			.350*	
	OEP	.155*	.187*	.175*			.231*	
	EE	.131*	-.140*	.187*	.621*		.519*	
	OE	.014	.026	.187*		.340*	.211*	

(SES, MA, AP, EEP, OEP = Independent Variables)

* Significantly greater than zero at the .05 level of significance, one-tail test

TABLE 7--continued

PANEL 3: Black Males

	Dependent Variables	SES	MA	AP	EEP	OEP	R^2
Previous Sample	AP	-.034	.384*				.162*
	EEP	.253*	.048	.334*			.307*
	OEP	.243*	.248*	.281*			.219*
	EE	.164	.031	.148	.440*		.235*
	OE	.272*	-.099	.291*		.222*	.204*
Current Sample	AP	.101	.318*				.112*
	EEP	.296*	.045	.421*			.260*
	OEP	.303*	.186*	.351*			.237*
	EE	.109	-.006	.244*	.417*		.370*
	OE	.188*	-.085	.285*		.267*	.238*

PANEL 4: White Males

	Dependent Variables	SES	MA	AP	EEP	OEP	R^2
Previous Sample	AP	.078	.494*				.242*
	EEP	.285*	.216*	.203*			.532*
	OEP	.170	.346*	.278*			.326*
	EE	-.031	.165*	-.030	.677*		.600*
	OE	.198	.372*	-.154		.302*	.325*
Current Sample	AP	.050	.654*				.429*
	EEP	.271*	.186*	.385*			.460*
	OEP	.210*	.266*	.285*			.297*
	EE	.180*	.053	.142*	.546*		.597*
	OE	.144*	.071	.134		.349*	.304*

(Independent Variables: SES, MA, AP, EEP, OEP)

* Significantly greater than zero at the .05 level of significance, one-tail test

TABLE 8

DATA FOR PATH MODEL IN FIGURE 2
USING SUBJECTIVE PROBABILITY MEASUREMENTS

	Dependent Variables	Independent Variables					
		SES	MA	AP	EEP(sp)	OEP(sp)	R^2
PANEL 1: Black Females	AP	.001	.250*				.040*
	EEP(sp)	.182*	.270*	.279*			.179*
	OEP(sp)	.139*	.214*	.235*			.237*
	EE(sp)	.143*	.034	.207*	.488*		.407*
	OE(sp)	.112*	.164*	.147*		.302*	.340*
PANEL 2: White Females	AP	.131*	.481*				.257*
	EEP(sp)	.244*	.233*	.206*			.323*
	OEP(sp)	.129*	.246*	.212*			.277*
	EE(sp)	.055	-.047	.175*	.612*		.456*
	OE(sp)	-.123*	-.009	.102*		.749*	.501*
PANEL 3: Black Males	AP	.101	.318*				.112*
	EEP(sp)	.243*	.116	.321*			.192*
	OEP(sp)	.224*	.112	.385*			.271*
	EE(sp)	-.013	.015	.202*	.530*		.446*
	OE(sp)	.015	.161*	.285*		.337*	.371*
PANEL 4: White Males	AP	.050	.654*				.429*
	EEP(sp)	.282*	.047	.448*			.369*
	OEP(sp)	.268*	.272*	.454*			.406*
	EE(sp)	.141*	.130*	.162*	.510*		.568*
	OE(sp)	.063	.183*	.060		.577*	.568*

* Significantly greater than zero at the .05 level of significance, one-tail test

educational expectations of black males has increased by a noticable amount, some other R-squares have declined by a small amount, most notably in the equation in which educational expectation of the parents of black males is the dependent variable. These data lend further support to the view that the subjective probability measures deserve more thorough analysis in a later publication.

Comparison of Sample to 1970 Census

This section compares the current Columbus sample to the most recent of the previous Columbus samples and to census data. The comparisons are carried out for four demographic variables, mother's high school graduation (MHSed), father's high school graduation (FHSed), family type (FT), and age of the head of the household (AGEhh). All comparisons are done within race, since the Columbus samples are balanced by race and therefore are, by design, unrepresentative of the population with regard to race. The two samples are compared to each other and to data from several census areas. The census areas to which sample data are compared include the Columbus Metropolitan Area, the Columbus SMSA, Franklin County (the county which contains most of Columbus), Urban Ohio, the North-Central census region, and the Urban U.S. Data on some of the comparison variables are not available in census publications for all census areas. Each table contains data from each of the above listed census areas in which information on the pertinent variable is published. The census data were taken from the 1970 census summaries, General Social and Economic Characteristics and Detailed Characteristics for the United States and for the state of Ohio. All census n's are estimates of total populations based on twenty-percent samples.

The first comparisons are for high school graduation of mother (MHSed) and of father (FHSed). MHSed is compared to adult females in census data, and FHSed is compared to adult males in the census. Table 9 contains the figures showing proportions graduating from high school. Statistical tests of the difference of proportions were calculated using the finite population multiplier in calculations involving the twenty-percent census sample data. Figures that are statistically significantly different from the current Columbus sample are marked by an asterisk.

In all comparisons of the current data to census data except for white females (mothers of student respondents), statistical significance is observed. The sample tends to have a smaller percentage of high school graduates than the census. For white females, comparison of the current Columbus sample to the Columbus SMSA, to Franklin County and to U.S. Urban are not significant. On the other hand, only one of the four tests of differences between the earlier and the current Columbus samples is statistically significant--the one for white females. In this case, the current sample matches the census proportions more closely than does the previous sample.

If one depends on statistical tests to determine differences, the following anomaly appears: The two samples do not differ from each other,

TABLE 9

PROPORTION OF PARENTS COMPLETING TWELVE OR FEWER YEARS OF SCHOOLING BY RACE AND SEX: COMPARISON OF COLUMBUS SAMPLES AND SIX 1970 CENSUS AREAS

				Census Areas					
Race	Sex	Current Columbus Sample	1975 Columbus Sample	Columbus Metropolitan	Columbus SMSA	Franklin County	Ohio Urban	North-Central Region	U.S. Urban
Black	Female	.805 n=359	.851 n=94	.882* n=25,532	.876* n=27,052	.876* n=26,641	.903* n=243,863	.888* n=1,133,796	.871* n=5,225,956
	Male	.791 n=335	.783 n=60	.876* n=21,887	.870* n=23,381	.869* n=22,951	.897* n=205,963	.887* n=972,273	.872* n=4,336,951
White	Female	.757 n=355	.853* n=11	.807* n=120,589	.775 n=220,547	.770 n=198,873	.828* n=2,051,588	.820* n=14,703,612	.789 n=38,108,638
	Male	.629 n=348	.650 n=103	.719* n=104,260	.688* n=195,495	.676* n=174,914	.752* n=1,794,213	.789* n=13,335,046	.707* n=33,362,905

*The proportion in the current Columbus sample differs from this proportion at the .05 level of significance

but the present sample differs from the census; whereas, the earlier sample does not. The main reason for this anomaly pertains to the sample size of the two samples. The sample size of the current sample is somewhat larger than that of the prior sample; hence, smaller observed discrepancies between the current sample and the census are required to obtain statistical significance.

It is concluded that the current Columbus sample and, quite possibly in light of the new evidence, the previous sample are somewhat biased regarding proportion of parents graduating from high school. Two points should be emphasized, however. First, the magnitude of the bias is not large, averaging some seven and a half percentage points. Secondly, available census data are for the entire adult population in 1970, not just for parents of teenagers in 1979. Without more detailed data, it is not clear what effect this discrepancy between the samples and census has on the comparisons.

Table 10 compares the two Columbus samples to each other and to three census areas for which data on family type are available in the 1970 census. Both samples show statistically significant differences with the census in proportion of intact families irrespective of which census area enters the comparison, but the two samples do not differ from each other by a large enough amount to be statistically significant. This may be due to change in the status of American households during the decade of the seventies. If household heads who are classified as "single" are omitted, 76 percent of household heads were estimated to be married in 1977 (Hammond Almanac, 1979). Applying the racial proportions in the population to the two samples in Table 10, one can create population estimates of proportion of intact families for black and white populations combined: for the current sample--.113 (.592) + .883 (.797) = .771, and for the previous sample--.113 (.560) + .883 (.816) = .784 (.113 is the proportion of blacks, and .883 the proportion of whites in 1977). Both of these figures are close to the census estimate for 1977. Omission of those classified as single from calculation of the 76 percent of household heads who are married was done because most of those single persons are probably less than thirty years old, and few if any parents of teenagers are under thirty (see Table 11).

Comparison among age distributions of the head of the household are displayed in Table 11. These comparisons are shown separately by race and family type. The complete distribution of age for the current Columbus sample was compared statistically to the previous sample and to the three census areas listed in the table. The Komolgorov-Smirnov two-sample test was applied. The census data are for households with at least one child between ages 13 and 19, inclusive. None of the statistical tests are statistically significant at the .05 level; hence, it is concluded that the age distribution of parents in the sample probably is not biased.

This section reveals several differences between sample distributions of demographic variables and 1970 census distributions. Many of the differences are statistically significant. Changes in the population since

1970 may account for some of the discrepancies, especially proportion of intact families, but some differences undoubtedly are due to sample bias. It should be emphasized, however, that with the possible exception of family type, none of the differences are of large magnitude.

TABLE 10

PROPORTION OF INTACT FAMILIES BY RACE:
COMPARISON OF COLUMBUS SAMPLES TO THREE CENSUS AREAS

			Census Areas		
Race	Current Columbus Sample	1975 Columbus Sample	Ohio Urban	North-Central Region	Urban U.S.
Black	.592 n=358	.560 n=116	.672* n=66,762	.653* n=305,623	.663* n=1,475,788
White	.797 n=355	.816 n=125	.907* n=702,521	.910* n=3,675,950	.896* n=12,522,725

Summary and Conclusion

This chapter presents comparisons between the current sample, previous Columbus samples, and the census. For several important variables related to career expectations, means, standard deviations, and standardized path-regression coefficients are compared between samples. While numerous differences in detail can be observed, the main features of the current sample match reasonably well those of the previous samples. Comparison of demographic variables in the current sample to census data reveal several statistically significant differences. However, the current and past sample match fairly closely in demographic composition. Some of the differences between the current sample and the comparison data can be explained fairly satisfactorily. For example, differences in operational definitions of AP between samples probably account for much of the between-sample differences in the behavior of statistics using the AP measure. Change in patterns of persistence of marriages may account for some of the discrepancies in percentage of intact families between the 1970 census and the samples. On the other hand, the generally lower correlations involving the SES measure in the current sample than in the previous samples is difficult to explain. It should be emphasized, however, that the SES differences are not exceptionally large and certainly not uniform across subgroups and correlates. It is concluded that the current sample provides an adequate data base for empirical tests of approximate theoretical models, providing of course, that caution is exercised regarding the gernalizability of the results.

TABLE 11

CUMULATIVE DISTRIBUTION OF AGE OF HEAD OF HOUSEHOLD BY RACE AND SEX FOR TWO COLUMBUS SAMPLES AND THREE CENSUS AREAS

		Family Type									
		Intact Families					Female Head of HH				
		Age of Head					Age of Head				
Race	Data Source	<35	35-44	45-64	≥65	N	<35	35-44	45-64	≥65	N
B	Sample 1	.000	.426	.979	1.000	47	.146	.756	1.000	1.000	41
L	Sample 2	.029	.478	.985	1.000	138	.151	.644	.925	1.000	146
A	Ohio Urban	.085	.510	.972	1.000	44,864	.208	.717	.994	1.000	21,898
C	N. Central	.096	.526	.972	1.000	199,502	.220	.712	.992	1.000	106,121
K	U.S. Urban										
W	Sample 1	.022	.457	.989	1.000	92	.190	.714	1.000	1.000	21
H	Sample 2	.027	.486	.991	1.000	222	.097	.403	.986	1.000	72
I	Ohio Urban	.041	.471	.983	1.000	637,053	.095	.503	.991	1.000	65,468
T	N. Central	.040	.460	.987	1.000	3,329,248	.091	.497	.990	1.000	328,702
E	U.S. Urban	.043	.460	.986	1.000	11,218,341	.097	.520	.992	1.000	1,302,726

NOTES:
1. Sample 1 refers to the 1975 study in Columbus.
2. Sample 2 refers to the present Columbus study.
3. Ohio Urban refers to the Ohio Urban census area.
4. N. Central refers to the North-Central census region.
5. U.S. Urban refers to urban census data for the U.S.
6. Census data are for households with at least one child between ages 13 and 19, inclusive.
7. The Kolmogorov-Smirnov test revealed no significant differences between age distributions, $p \leq .05$.

CHAPTER 4

CROSS-SECTIONAL MODELS WITH FEEDBACK LOOPS

The path models in the preceding chapter were all recursive, meaning no feedback loops were permitted. The recursive nature of these models follows usual practice in the empirical literature, but it violates theory cited in Chapter 1 about the presence of causal feedback among the expectation variables and academic performance. For example, following usual (but not universal) practice, in the preceding chapter it was assumed that academic performance of a youth in high school affects the parents' educational and occupational expectations of the youth and the educational and occupational expectations that the youth holds for self. There is every justification for these assumptions. Parents and youth observe how well the youth does in school, take school grades as an indicator of future success, and adjust expectations accordingly. The problem is that there is equally strong justification for the assumption that academic performance is affected by the expectation variables. Those with high expectations and parents who hold high expectations for them adjust their effort in school upward, and vice versa. Similar arguments can be offered to support the probable feedback among all four expectation variables. Parents' educational and occupational expectations of youth undoubtedly affect each other. Similarly, the youth's educational and occupational expectations of self undoubtedly affect each other. Finally, the youth's expectations of self probably influence the expectations that his/her parents hold.

These theoretical arguments can be expressed in a system of structural equations in which all possible feedback loops are permitted among the endogenous variables. Equation system (1) expresses such a model using the variables studied in Chapter 3.

$$
\begin{aligned}
&(1a)\quad AP = b_{12}EEP + b_{13}OEP + b_{14}EE + b_{15}OE + c_{10} + c_{11}SES + c_{12}MA + u_1 \\
&(1b)\quad EEP = b_{21}AP + b_{23}OEP + b_{24}EE + b_{25}OE + c_{20} + c_{21}SES + c_{22}MA + u_2 \\
&(1c)\quad OEP = b_{31}AP + b_{32}EEP + b_{34}EE + b_{35}OE + c_{30} + c_{31}SES + c_{32}MA + u_3 \\
&(1d)\quad EE = b_{41}AP + b_{42}EEP + b_{43}OEP + b_{45}OE + c_{40} + c_{41}SES + c_{42}MA + u_4 \\
&(1e)\quad OE = b_{51}AP + b_{52}EEP + b_{53}OEP + b_{54}EE + c_{50} + c_{51}SES + c_{52}MA + u_5
\end{aligned}
$$

While equation system (1) reflects the theory more adequately than the recursive models, as noted briefly in Chapter 2, technical difficulties

arise when nonrecursive structural equations, such as system (1), are studied. The difficulties are especially acute when statistical analysis is confined to cross-sectional data, as in the present case.

Because of the importance of the identification question to this study and to status-attainment research in general, this chapter devotes considerable attention to the issue. The discussion is substantially longer and more technical than would normally be the case in an empirical report. The first author is untroubled by this departure from convention, for he believes that technical discourse on statistically method tends to be too sharply separated from substantive research. In this author's view, more frequent blending of technical and substantive topics offers potential for improving understanding of both the substantive and technical material.

The identification issue centers on the question of whether unknown parameters of a set of equations can be deduced uniquely from observable information. A pair of simple examples of the mathematical problem provides some insight into the nature of identification. Consider the following pair of equations.

$$a + b = 1$$

$$a - b = 1/2$$

If these two equations are added, one finds

$$2a = 3/2$$

$$a = 3/4$$

Putting $a = 3/4$ back into the first of these two equations and solving for b leads to $b = 1/4$. There are no other possible values of a and b that satisfy these two equations; hence, the two equations have a unique solution. In contrast, observe the following two equations.

$$2a - b = 1$$

$$-1.5a + .75b = -.75$$

Note that numerous pairs of values a, b satisfy both of these equations. For example, $a = 1$, $b = 1$ is one solution. But, $a = 3$, $b = 5$ also satisfy both equations. In fact, an infinite number of values of a and b satisfy both equations; b can be choosen arbitrarily and $a = 1/2(1+b)$ used to find a. Since the second equation is just $-.75$ times the first, any values satisfying the first also satisfy the second. The system is therefore underidentified.

The remainder of this chapter divides into two sections. The first section reviews the most frequent econometric treatment of the identification issue and presents an example from the current Columbus sample. The results are not satisfactory, either empirically or theoretically. The type of assumptions that must be imposed to achieve

identification with the traditional econometric model are not well suited to career-expectations theory. Consequently, alternative models are examined in which the theorist is free to specify assumptions about correlations between all measured and all disturbance variables. It is concluded that ordinary least squares (OLS) estimation of a career expectation model with causal feedback is more satisfactory than estimations that might be derived from the major competing methods such as indirect least squares or two-stage least squares, but, not surprisingly, OLS methods also are not entirely satisfactory.

Identification without Use of Assumptions about Covariances between Jointly Dependent Variables and Disturbances

In this section, the most usual treatment of the identification issue in the econometric literature is reviewed. The key assumption here is that disturbances may correlate with more than one jointly dependent variable, i.e., variables determined in part by other measured variables in the model. Most of the results included here are known generally, so citations documenting specific theorems are omitted. Numerous sources were consulted in preparing this review, most notably Fisher (1976), Koopmans, Rubin, and Leipnik (1950), Koopmans (1953), Johnston (1963), and Goldberger (1964).

The technical discussion of identification of equation system (1) is facillitated by adoption of a more compact notation. Accordingly, define the following matrices and vectors.

$\underline{B} = [b_{k\ell}]$, with $b_{kk} = -1$; $k, \ell = 1, \ldots, K$

$\underline{C} = [c_{k\ell}]$; $k = 1, \ldots, K$; $\ell = 0, 1, \ldots, L$

$\underline{y} = [y_k]$; $k = 1, \ldots, K$ (a column vector)

$\underline{z} = [z_\ell]$; $\ell = 0, 1, \ldots, L$ (a column vector)

$\underline{u} = [u_k]$; $k = 1, \ldots, K$ (a column vector)

For the present case:

y_1 = AP (academic performance)

y_2 = EEP (educational expectation of parents)

y_3 = OEP (occupational expectation of parents)

y_4 = EE (educational expectation of parents)

y_5 = OE (occupational expectation of parents)

z_0 = 1.0 (unity for all cases)

z_1 = SES (socioeconomic status)

z_2 = MA (measured mental ability)

Much of the formal discourse applies irrespective of the content of $\underline{y}$ and $\underline{z}$, but the substantive content will help to juxtapose the methodological theory with the substantive theory.

The equations in the structural system now can be written compactly in matrix notation.

(2) $\underline{0} = \underline{By} + \underline{Cz} + \underline{u}$

where $\underline{0}$ is a conformable null matrix. At least four important assumptions generally are imposed on the model given in (2). These assumptions are:

Assumption 1: The means of all disturbance variables $\underline{u}$ are zero, i.e., $\underline{Eu} = \underline{o}$, where E denotes the expected value operation, and $\underline{o}$ is a K x 1 null vector.

Assumption 2: All covariances between predetermined variables $\underline{z}$ and the disturbances are zero, i.e, $\underline{Euz'} = \underline{0}$ where $\underline{0}$ is a Kx(L+1) null matrix, and a prime affixed to a vector or matrix denotes the transpose of the vector or matrix.

Assumption 3: No particular pattern of zero covariances between the jointly dependent variables $\underline{y}$ and the disturbances $\underline{u}$ can be assumed a priori.

Assumption 4: The coefficient matrix of the jointly dependent variables, $\underline{B}$, is nonsingular, i.e., $|\underline{B}| \neq 0$, where $|\underline{B}|$ denotes the determinant of $\underline{B}$.

Assumption 3 is generally introduced when causal feedback is contained in a system of structural equations, on the assumption that if y_1 affects y_2 and y_2 affects y_1, then y_1 must be correlated with the disturbance for y_2, and vice versa.

Using assumption 4, the reduced form of the model given by (2) is derived by solving (2) for the vector of jointly dependent variables.

$$\underline{y} = -\underline{B}^{-1}\underline{Cz} - \underline{B}^{-1}\underline{u}$$

(3) $\underline{y} = \underline{Pz} + \underline{v}$

with

(4a) $\underline{B}\,\underline{P} = -\underline{C}$; $\underline{P}'\underline{B}' = -\underline{C}'$

(4b) $\underline{v} = -\underline{B}^{-1}\underline{u}$

$\underline{P}$ is called the matrix of reduced-form coefficients. Since it is assumed that $E\underline{uz}' = \underline{O}$, $\underline{P}$ may be derived directly from equation (3) by postmultiplying (3) by $\underline{z}'$, taking expectations, and dropping the zero covariance matrix, $E\underline{uz}'$. These operations yield

(5) $\underline{P} = E\underline{yz}'(E\underline{zz}')^{-1}$

Given $\underline{P}$ from equation (5), the coefficients of the structure, $\underline{B}$ and $\underline{C}$, must be deduced from the relation in (4a). The transpose relation given in (4a) can be written in supermatrix notation as a set of K systems of homogeneous linear equations.

(6) $[\underline{P}'\underline{I}] \begin{bmatrix} \underline{B}' \\ \underline{C}' \end{bmatrix} = \underline{O}$

with $\underline{I}$ an (L+1) x (L+1) identity matrix, and $\underline{O}$ an (L+1) x K null matrix. Each column of the supermatrix $[\underline{B}\ \underline{C}]'$ contains M+1 = K+L+1 unknown coefficients, but there are only L+1 equations in the system (6). Since it is assumed that $K \geq 2$, the number of unknowns always exceeds the number of equations by at least two; consequently, even with the norming rule $b_{kk} = -1$, there is no unique solution to (6).

As shown by equation (6), the structural parameters $[\underline{B}'\underline{C}']$ fall in the column kernel of the supermatrix $[\underline{P}'\underline{I}]$. Since $[\underline{P}'\underline{I}]$ can be put in echelon form simply by interchanging $\underline{I}$ and $\underline{P}'$, and it has L+1 rows and M+1 columns, its rank is L+1. The column order of the kernel of $[\underline{P}'\underline{I}]$, thus, is (M+1) - (L+1) = (K+L+1) - (L+1) = K, the number of equations in the system. A basis for the structure can be represented by the supermatrix $[-\underline{I}\ \underline{P}]'$; all vectors in the kernel can be derived as nonsingular transformations of this basis.[8] Since there are an infinite number of such transformations, the coefficients of the structure are not determined uniquely by (6). The need to impose theoretical restrictions on the model is evident.

The idea of nonsingular linear transformations of the structure is central to the concept of identification; hence, some amplification of the above conclusion is in order. Consider a second set of structural coefficients, defined by the nonsingular linear transformation:

---

[8]The echelon form of a matrix occurs when elementary operations have been used to transform the structure such that, reading from left to right, the first nonzero entry in each row occurs to the right of the first nonzero entry in all rows above it. The rank of a matrix in echelon form equals the number of rows having at least one nonzero entry. The column kernel of a matrix $\underline{A}$ is the set of all conformable vectors $\underline{x}$ such that $\underline{Ax} = \underline{o}$. A basis for a solution space is a set of linearly independent vectors from which all solutions can be derived as linear transformations.

$$\underline{B}_*' = \underline{B}'\underline{T}$$

$$\underline{C}_*' = \underline{C}'\underline{T}$$

where $\underline{T}$ is a nonsingular transformation matrix. Equation (6) is insufficient to distinguish $\underline{B}'$ from $\underline{B}_*'$ and $\underline{C}'$ from $\underline{C}_*'$:

$$[\underline{P}'\underline{I}] \begin{bmatrix} \underline{B}_*' \\ \underline{C}_*' \end{bmatrix} = [\underline{P}'\underline{I}] \begin{bmatrix} \underline{B}'\underline{T} \\ \underline{C}'\underline{T} \end{bmatrix} = [\underline{P}'\underline{I}] \begin{bmatrix} \underline{B}' \\ \underline{C}' \end{bmatrix} \underline{T} = \underline{0}\underline{T} = \underline{0}$$

Hence, with available information in (6), the choice between $\underline{B}'$ and $\underline{B}_*'$, and between $\underline{C}'$ and $\underline{C}_*'$ is entirely arbitrary, and there are an infinite number of other alternatives satisfying equation (6).

Note that the substantive model given by equation system (1) certainly is not identified without further restrictions. The only restrictions on the parameters are that $b_{kk} = -1$, all k. Hence, one could not use equation (6) to derive unique structural parameters of the model of career expectations.

Each column of $[\underline{B}\ \underline{C}]'$ is a solution to L+1 homogeneous linear equations in M+1 = K+L+1 unknowns. Let the kth column of $[\underline{B}\ \underline{C}]'$ be denoted by $[\underline{b}_k\ \underline{c}_k]'$, where $\underline{b}_k'$ is the kth column of $\underline{B}'$, and $\underline{c}_k'$ is kth column of $\underline{C}'$. For simplicity, the subscripts on $\underline{b}_k'$ and $\underline{c}_k'$ will be dropped unless necessary for clarity. The kth column of (6) can now be written.

$$(7)\quad [\underline{P}'\underline{I}] \begin{bmatrix} \underline{b}' \\ \underline{c}' \end{bmatrix} = \underline{o}$$

where $\underline{o}$ is an (L+1) x 1 null vector. To achieve unique identification of (7), one must append K independent linear restrictions that are also independent of $[\underline{P}'\underline{I}]$, which, taken as a set cannot be homogeneous linear equations. These restrictions must be drawn from theory. Let the restrictions be of the form

$$\underline{Q}_1\underline{b}' + \underline{Q}_2\underline{c}' = \underline{q}$$

where $\underline{Q}_1$ is a K x K matrix, $\underline{Q}_2$ is a K x (L+1) matrix, and $\underline{q}$ is a K x 1 nonzero vector, $\underline{q} \neq \underline{o}$. (If $\underline{q} = \underline{o}$, it implies that $\underline{b} = \underline{o}$, and $\underline{c} = \underline{o}$). Now, creating an expanded supermatrix, a unique solution for $\underline{b}$ and $\underline{c}$ can be found, as follows.

$$(8a)\quad \begin{bmatrix} \underline{P}' & \underline{I} \\ \underline{Q}_1 & \underline{Q}_2 \end{bmatrix} \begin{bmatrix} \underline{b}' \\ \underline{c}' \end{bmatrix} = \begin{bmatrix} \underline{o} \\ \underline{q} \end{bmatrix}$$

$$(8b)\quad \begin{bmatrix} \underline{b}' \\ \underline{c}' \end{bmatrix} = \begin{bmatrix} \underline{P}' & \underline{I} \\ \underline{Q}_1 & \underline{Q}_2 \end{bmatrix}^{-1} \begin{bmatrix} \underline{o} \\ \underline{q} \end{bmatrix}$$

The existence of the inverse of the supermatrix is guaranteed by the assumption that $[\underline{Q}_1\ \underline{Q}_2]$ are comprised of K independent rows that are

also independent of $[\underline{P}'\underline{I}]$ and the fact that the rank of $[\underline{P}'\underline{I}]$ is L+1. Thus, the supermatrix in (8) is square of order M+1, its rank is M+1, and it is, therefore, nonsingular. When exactly K rows are contained in $\underline{Q}_1$, $\underline{Q}_2$, and $\underline{q}$, the system is just identified. When more than K rows are included, the system is overidentified, but its rank is still M+1. Hence, any K independent rows may be selected to arrive at (8).

By far the most common form of the restrictions is to stipulate the diagonal element of $\underline{b}$ is -1 and at least K-1 other elements in $\underline{b}$ or $\underline{c}$ are zero. This pattern of assumptions is sometimes called zero assumptions. The zero assumptions can be represented by letting the kth element of q be -1, and setting the rest to zero, combined with permutations of K x 1 elementary unit vectors comprising the columns of $\underline{Q}_1$ and $\underline{Q}_2$. To see how this is accomplished, take equation (1a) in which academic performance is the dependent variable. Suppose one wishes to assume that the coefficients associated with SES (c_{11}), OEP (b_{13}), and OE (b_{15}) are zero, and set $b_{11} = -1$. The following lay out of equation (8a) expresses these assumptions.

$$\begin{bmatrix} p_{10} & p_{20} & p_{30} & p_{40} & p_{50} & 1 & 0 & 0 \\ p_{11} & p_{21} & p_{31} & p_{41} & p_{51} & 0 & 1 & 0 \\ p_{12} & p_{22} & p_{32} & p_{42} & p_{52} & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} b_{11} \\ b_{12} \\ b_{13} \\ b_{14} \\ b_{15} \\ c_{10} \\ c_{11} \\ c_{12} \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ -1 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

Here

$$\underline{Q}_1 = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}; \quad \underline{Q}_2 = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}, \quad \underline{q} = \begin{bmatrix} -1 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

Since K = 5, and only 4 restrictions have been stipulated, equation (1a) still is not identified. It is difficult to decide that any other coefficients even tentatively should be zero. Even the assumptions made already violate the theoretical presumption that all possible feedback loops

occur among the jointly dependent variables. This issue will be raised again presently.

The investigation of the last few paragraphs was confined to identification of one structural equation taken in isolation from the others. For the restrictions to be meaningful, however, they should be such that, given the data. only one structure conforms to them. Thus, transformations of the form

$$\underline{B}_*' = \underline{B}'\underline{T}$$

$$\underline{C}_*' = \underline{C}'\underline{T}$$

must be such that, either $\underline{T} = \underline{I}$, or the transformation destroys the pattern of zero assumptions implied by the set of K restriction sets such as $\underline{\Omega}_1$, $\underline{\Omega}_2$, and $\underline{q}$. To investigate the conditions required to assure that $\underline{T} = \underline{I}$ is the only legitimate transformation, partition $\underline{b}_k$ into $\underline{b}_{ok}$ and $\underline{b}_{1k}$ representing respectively the zero and nonzero parts of $\underline{b}_k$, and partition $\underline{c}_k$ in an analogous way--$\underline{c}_{ok}$, $\underline{c}_{1k}$. Let the remaining columns of $\underline{B}'$ be partitioned into B_{ok}' and B_{1k}' corresponding to the rows of $\underline{b}_{ok}'$ and $\underline{b}_{1k}'$, respectively. Finally, partition the remaining columns of $\underline{C}'$ in an analogous fashion with $\underline{C}_{o\bar{k}}'$ and $\underline{C}_{1\bar{k}}'$ corresponding to rows of $\underline{c}_{ok}'$ and $\underline{c}_{1k}'$, respectively.

The matrices $\underline{B}'$ and $\underline{C}'$ can now be written in partitioned form, as follows, using k = 1 as an example:

$$\underline{B}' = \begin{bmatrix} \underline{b}_{o1}' \underline{B}_{o\bar{1}}' \\ \underline{b}_{11}' \underline{B}_{1\bar{1}}' \end{bmatrix} \qquad \underline{C}' = \begin{bmatrix} \underline{c}_{o1}' \underline{C}_{o\bar{1}}' \\ \underline{c}_{11}' \underline{C}_{1\bar{1}}' \end{bmatrix}$$

For a linear transformation to preserve the zero elements in $\underline{b}'$ and $\underline{c}'$ one must have

$$\begin{bmatrix} \underline{b}_{o1}' \underline{B}_{o\bar{1}}' \\ \underline{c}_{o1}' \underline{C}_{o\bar{1}}' \end{bmatrix} \begin{bmatrix} t_1 \\ \underline{t}_2 \end{bmatrix} = \begin{bmatrix} \underline{o} \\ \underline{o} \end{bmatrix}$$

where t_1 is a scalar element of the first row and column of $\underline{T}$, and $\underline{t}_2$ is the vector of remaining elements in the first column of $\underline{T}$. Since $\underline{b}_{o1}$ and $\underline{c}_{o1}$ are null vectors, this result holds if

$$(9) \quad \begin{bmatrix} \underline{B}_{o\bar{1}}' \\ \underline{C}_{o\bar{1}}' \end{bmatrix} [\underline{t}_2] = \underline{o}$$

There are K - 1 columns in $\underline{B}_{o\bar{1}}$ and $\underline{C}_{o\bar{1}}$, and if superflous overidentifying restrictions have been removed, there are K - 1 rows in the supermatrix $[\underline{B}_{o\bar{1}}\ \underline{C}_{o\bar{1}}]'$. Hence if the determinant of $[\underline{B}_{o\bar{1}}\ \underline{C}_{o\bar{1}}]'$ is nonzero, the only solution to (9) is the zero solution, $\underline{t}_2 = \underline{o}$, and no linear transformation of the structure exists that preserves the assumptions

about zero values in $\underline{b}_1$ and $\underline{c}_1$. This conclusion generalizes to each column of $[\underline{B}\ \underline{C}]'$.

To summarize for the case of zero assumptions, a necessary and sufficient condition for the identification of the kth structural equation in (2) is that the rank of $[\underline{B}_{\overline{o1}}\ \underline{C}_{\overline{o1}}]'$ is K - 1 (one less than the number of equations. The matrix $[\underline{B}_{\overline{o1}}\ \underline{C}_{\overline{o1}}]'$ is formed by deleting the kth column of $[\underline{B}\ \underline{C}]'$ and keeping the rows of $[\underline{B}\ \underline{C}]'$ corresponding to the rows of $\underline{b}_k'$ and $\underline{c}_k'$ that are set to zero.

Since $[\underline{B}_{\overline{o1}}\ \underline{C}_{\overline{o1}}]'$ cannot be rank K - 1 unless it contains at least K - 1 rows, the necessary condition derived from examining the kth structural equation in isolation is confirmed by this analysis of all equations. It is apparent, however, that existence of K - 1 rows in $[\underline{B}_{\overline{o1}}\ \underline{C}_{\overline{o1}}]'$ is not the only condition that this matrix must satisfy. For example, not all the entries in any column can be zero. Since, by definition $b_{o1} = \underline{o}$, and $\underline{c}_{o1} = \underline{o}$, the nonzero restriction on columns of $[\underline{B}_{o1}\ \underline{C}_{o1}]$ implies an additional necessary condition for the identification of any structure: no two equations may contain the same pattern of zero coefficients. None of the equations sharing the same pattern of zero coefficients is identified.

Application of these identification rules to the model of career expectations expressed by equation-system (1) is instructive. It is immediately obvious that assumptions 1 through 4 render equations (1) not identified. Not a single coefficient of the predetermined variables ($\underline{C}$) or the jointly dependent variables ($\underline{B}$) are set to zero a priori. Since there is some suggestion in the literature that SES and MA operate indirectly on the career expectations of youth, one might set the coefficients for SES and MA to zero in the equations for EE and OE, i.e., assume $c_{41} = c_{42} = c_{51} = c_{52} = 0$. These assumptions are insufficient to identify either equation, however. Only two coefficients in each equation have been set to zero, but four coefficients must be estimated from data. Further, equations (1d) and (1e) have the same pattern of zero coefficients. Hence, neither equation (1d) nor (1e) is identified, because neither one meets either of the necessary conditions for identifiability cited above.

So long as one insists that all possible feedback loops among the expectation variables and academic performance be permitted, the only hope for identifying the system under the current assumptions is to add predetermined variables that have no direct effect on several of the jointly dependent variables. Since there are four coefficients of the jointly dependent variables in each equation to be estimated from data, at least four predetermined variables with zero direct effect must be included for each equation. One cannot just pick four predetermined variables and set their coefficients to zero in every equation, however, because to do so violates the necessary condition that the same pattern of zeros cannot occur in two or more equations. Thus, at least one coefficient of a predetermined variable (c's) must be estimated from data in each equation, but at least four coefficients of predetermined variables must be set to zero in order to estimate the four coefficients of the jointly dependent variables (b's). The conclusion is, therefore, that at least five predetermined variables

must be included. Identification may proceed by identifying one nonzero coefficient of a predetermined variable and four zero coefficients of a predetermined variable in each equation, but the nonzero coefficient must not be associated with the same predetermined variable in any two equations.

These conditions of identifiability are extremely artificial. There is no good theoretical basis for writing a model to meet the required assumptions. For expository purposes, however, a model meeting these conditions is presented and estimated from data. For this model, the SES index is disaggregated into its component parts, father's occupational status (FO), father's education (FE), and mother's education (ME). With measured mental ability (MA), this disaggreation yields four predetermined variables, one less than the required five. Consequently, family income (FI) is appended to the set of predetermined variables. The following assumptions are used to generate sample estimates of the nonzero parameters:

1. MA has a direct effect on AP and no direct effect on any other jointly dependent variable.

2. FI has a direct effect on EEP and no direct effect on any other jointly dependent variable.

3. FO has a direct effect on OEP and no direct effect on any other jointly dependent variable.

4. ME has a direct effect on EE and no direct effect on any other jointly dependent variable.

5. FE has a direct effect on OE and no direct ef[illegible] on any other jointly dependent variable.

Empirical estimates of this model are shown in Table 12. Estimation is by indirect least squares (ILS), since each equation is just-identified. In the case of just-identified equations, ILS produces the same output that methods such as two-stage least squares produce that are designed for over-identified equation systems. Note that all expectation variables are measured by the subjective probability method.

With few exceptions these estimates are not credible. Only one coefficient in all four panels of the table is significantly greater than zero at the .05 level of significance. The signs of the coefficients fluctuate erratically, forming no pattern that is predictable theoretically. The absolute magnitude of many of the coefficients exceeds one, a result that is difficult to interpret for standardized coefficients. Finally, most R-squares are negative, meaning that the variance of the dependent variable is smaller than the mean-square error generated by the model. It should be emphasized, however, that the absolute magnitude of the coefficients and the R-squares do not contain much information in cross-sectional data; as will be shown below, for the dynamic model underlying this study, cross-sectional

TABLE 12

INDIRECT LEAST-SQUARES ESTIMATION OF A MODEL OF CAREER EXPECTATIONS AND ACADEMIC PERFORMANCE CONTAINING FEEDBACK LOOPS

	Regressand	Intercept	Predetermined Variables					Jointly Dependent Variables					R^2
			FO	FE	ME	FI	MA	AP	EEPsp	OEPsp	EEsp	OEsp	
PANEL 1: Black Females	AP	1.459	0	0	0	0	.987	-1.0	-.126	-5.826	3.958	-.376	-20.624
	EEPsp	-.012	0	0	0	.098	0	.631	-1.0	.122	.579	-.023	.121
	OEPsp	.187	.095	0	0	0	0	.885	.038	-1.0	.134	-.008	-.604
	EEsp	-.020	0	0	.092	0	0	-.210	.617	-.143	-1.0	.447	.400
	OEsp	.128	0	.063	0	0	0	.394	-.247	.968	.052	-1.0	-.267
PANEL 2: White Females	AP	.233	0	0	0	0	.490	-1.0	.108	-.637	.800	-.042	-.004
	EEPsp	-.584	0	0	0	.169	0	-1.035	-1.0	3.265	-.767	-.414	-3.540
	OEPsp	.274	-.202	0	0	0	0	.315	1.393	-1.0	-.468	-.531	-.454
	EEsp	-.300	0	0	.447	0	0	1.491	-1.377	.150	-1.0	-.278	-2.631
	OEsp	-.284	0	-.141	0	0	0	-.695	-.906	2.567	.204	-1.0	-1.279
PANEL 3: Black Males	AP	.350	0	0	0	0	.639	-1.0	-.258	2.008	-.869	-1.713	-4.336
	EEPsp	-.069	0	0	0	-.282	0	.838	-1.0	1.054	1.700	-1.851	-2.327
	OEPsp	.624	.485	0	0	0	0	4.859	2.152	-1.0	-3.573	-3.615	-25.572
	EEsp	-.140	0	0	-.155	0	0	-.696	1.736	-1.080	-1.0	.962	-1.607
	OEsp	5.199	0	-6.452	0	0	0	-17.997	10.349	34.539	-29.011	-1.0	-1183.298
PANEL 4: White Males	AP	-.661	0	0	0	0	.780	-1.0	.950	-.292	-.097	-.451	.164
	EEPsp	.029	0	0	0	-.034	0	-.271	-1.0	1.427	.278	-.733	.043
	OEPsp	.026	-.029	0	0	0	0	.063	.631*	-1.0	-.021	.570	.677
	EEsp	.413	0	0	.493	0	0	-.159	-1.292	-1.019	-1.0	2.770	-3.925
	OEsp	.207	0	-.181	0	0	0	-1.002	-1.596	2.950	.211	-1.0	-1.903

* Significantly greater than zero at p (α) $\leq$ .05

data generate estimates of parameters only up to an indeterminant constant of proportionality within each equation.

Identification Including Use of Assumptions about Covariances between Jointly Dependent Variables and Disturbances

There are, of course, other specifications of the model that could be tried within the assumptions 1 through 4 that meet the conditions of identifiability most commonly stated in the econometric literature. To recapitulate, the necessary conditions are that at least as many coefficients of predetermined variables in each equation must be assumed zero as there are coefficients of jointly dependent variables to be estimated from data. Further, the same pattern of zero assumptions cannot be repeated in two or more equations. These conditions do not suit the substantive theory of formation of career expectations very well. Consequently, rather than specify alternative models meeting these conditions, this section examines the consequences of dropping assumption 3 (no pattern of zero covariances between jointly dependent and disturbance variables can be assumed) and assumption 4 ($|\underline{B}| \neq 0$).

The manner in which the covariances among disturbances and jointly dependent variables can contribute to identification of the model given by equations (1) may be examined by generalizing equation (6). To this end, first postmultiply the structural equation (2) by $\underline{y}'$ and take expectations, then postmultiply by $\underline{z}'$ and take expectations. The results are:

(10a) $\underline{0} = \underline{B}E\underline{yy}' + \underline{C}E\underline{zy}' + E\underline{uy}'$

(10b) $\underline{0} = \underline{B}E\underline{yz}' + \underline{C}E\underline{zz}'$

This result can be expressed in supermatrix notation paralleling equation (6).

(11) $$\begin{bmatrix} E\underline{yy}' & E\underline{yz}' & \underline{I} \\ E\underline{zy}' & E\underline{zz}' & \underline{0} \end{bmatrix} \begin{bmatrix} \underline{B}' \\ \underline{C}' \\ E\underline{yu}' \end{bmatrix} = \begin{bmatrix} \underline{0} \\ \underline{0} \end{bmatrix}$$

Note that (11) is a generalization of (6). Since, from (5), $\underline{P}' = (E\underline{zz}')^{-1}E\underline{zy}'$, premultiplying (6) by $E\underline{zz}'$ leads to:

$$E\underline{zz}'[\underline{P}'\underline{I}] \begin{bmatrix} \underline{B}' \\ \underline{C}' \end{bmatrix} = [E\underline{zy}' \; E\underline{zz}'] \begin{bmatrix} \underline{B}' \\ \underline{C}' \end{bmatrix} = \underline{0}$$

From this result it is evident that equation (6) is just the second row of matrices in (11), or equivalently, (6) is the transpose of (10b).

The same criteria of identifiability applied to equation (6) can be applied to (11). First, note that there are K unknowns in each column of $\underline{B}'$ plus L+1 unknowns in each column of $\underline{C}'$, plus K unknowns in each column of $E\underline{y}\underline{u}'$, for a total of 2K + L + 1 unknowns. There are M+1 = K + L + 1 equations; hence, there are just K more unknowns than equations.

Let the cross-products matrix in (11) be denoted by $\underline{Q}$, and partion $\underline{Q}$ in the obvious way, so that

$$\underline{Q} = \begin{bmatrix} \underline{Q}_{11} & \underline{Q}_{12} \\ \underline{Q}_{21} & \underline{Q}_{22} \end{bmatrix} = \begin{bmatrix} E\underline{y}\underline{y}' & E\underline{y}\underline{z}' \\ E\underline{z}\underline{y}' & E\underline{z}\underline{z}' \end{bmatrix}$$

Denote the partioned inverse of $\underline{Q}$ by

$$\underline{Q}^{-1} = \begin{bmatrix} \underline{Q}_{11} & \underline{Q}_{12} \\ \underline{Q}_{21} & \underline{Q}_{22} \end{bmatrix}^{-1} = \begin{bmatrix} \underline{Q}^{11} & \underline{Q}^{12} \\ \underline{Q}^{21} & \underline{Q}^{22} \end{bmatrix}$$

Now, since $\underline{Q}_{11}\underline{Q}^{11} + \underline{Q}_{12}\underline{Q}^{21} = \underline{I}$, and $\underline{Q}_{21}\underline{Q}^{11} + \underline{Q}_{22}\underline{Q}^{21} = \underline{0}$, by virtue of the definition of an inverse, one basis for the column kernel of (11) is given by

$$(12) \quad \begin{bmatrix} \underline{B}' \\ \underline{C}' \\ E\underline{y}\underline{u}' \end{bmatrix} = \begin{bmatrix} -\underline{Q}^{11} \\ -\underline{Q}^{21} \\ \underline{I} \end{bmatrix}$$

Inserting (12) into (11) confirms that it is a set of K solutions to the M+1 homogeneous linear equations represented by (11). Further, note that no linear transformation except the identity transformation preserves the identity matrix in (12); hence, the solutions given by (12) are just identified. The diagonal entries of $\underline{B}' = -\underline{Q}^{11}$ are not necessarily negative one, however. This norming rule can be imposed on the solution by postmultiplying by the inverse of a diagonal matrix with diagonal entries containing the diagonal of the matrix $\underline{Q}^{11}$. Denote the inverse of this diagonal matrix by $\underline{S}^2$. The normed solution, thus, becomes

$$(13) \quad \begin{bmatrix} \underline{B}' \\ \underline{C}' \\ E\underline{y}\underline{u}' \end{bmatrix} = \begin{bmatrix} -\underline{Q}^{11} \\ -\underline{Q}^{21} \\ \underline{I} \end{bmatrix} \underline{S}^2 = \begin{bmatrix} -\underline{Q}^{11}\underline{S}^2 \\ -\underline{Q}^{21}\underline{S}^2 \\ \underline{S}^2 \end{bmatrix}$$

Thus, the matrix $\underline{S}^2$ is a diagonal matrix with diagonal entries giving the covariances between one jointly dependent variable $\underline{y}$ and one disturbance $\underline{u}$; all off-diagonal covariances between $\underline{y}$ and $\underline{u}$ are assumed zero. It can be demonstrated algebraically that (13) is the ordinary least-squares (OLS) solution applied to each equation of the structure, and that the diagonal entries of $\underline{S}^2$ are variances of the disturbance variables.

With the norming rule $b_{kk} = -1$, all k, equation (13) is identified uniquely; no transformation other than the identity transformation keeps all the a priori restrictions intact. This conclusion implies that OLS supplies a just-identified solution to a system of structural equations including all possible feedback loops among the jointly dependent variables and all possible direct effects of predetermined variables on dependent variables. Use of OLS to calculate effect parameters in structural equation systems including causal feedback violates widespread convention in the literature. It is generally believed that OLS is inappropriate when causal feedback is present (see, e.g., Hout and Morgan, 1975; Goldberger, 1973; Land, 1971; Henry and Hummon, 1971; and Freeman, 1971).

To show the conditions which uniquely identify OLS calculation of parameters in systems with feedback does not demonstrate that the necessary assumptions are advisable. The argument here has shown only that if one is willing to assume that all regressors in each equation of a system are uncorrelated with the disturbance variable in that equation, then OLS methods are identified. This assumption is expressed by the diagonal structure of $\underline{S}^2_\zeta$.

Since equation (11) is underidentified, some assumptions are manditory if empirical work is to be carried out. The question, then, is which set of assumptions is the best reflection of current substantive theory? It is likely that no set of assumptions can be made with complete confidence. If the substantive theory is not strong enough to justify one set of assumptions as clearly superior to others, then that set of assumptions least in conflict with the best available substantive theory should be selected. The degree of confidence in the outcome, of course, must depend heavily on confidence in the substantive theory justifying the assumptions. In some cases it may be advisable to use different specifications and compare the results.

Applying the results of the previous and current section to the system of career expectation variables leads to a basic question: Faced with a necessary choice, is it preferable to assume that some but not all, of the predetermined variables have no direct effect on the career expectation variables and on academic performance or to assume that all regressors (including jointly dependent variables involved in feedback loops with the regressand) are uncorrelated with the disturbance? The theoretical discussion of developing career plans suggests that assumptions of zero correlations involving disturbances are preferable to setting to zero any coefficients of effects of measured variables on other measured variables, since setting such coefficients to zero either a) violates the assumption of feedback, or b) states by assumption that direct effects of some, but not all, exogenous variables are zero.

While the author believes that the OLS assumptions probably are preferable to those demanded by the alternatives discussed, the choice is not clear cut. There is some theoretical basis for presuming that direct effects of the predetermined variables are zero (e.g., Sewell, Haller, and Portes, 1969). Theoretical suggestions to this effect, however, have always

been accompanied by calls to submit the hypotheses to empirical test; if the coefficients indexing effects of SES and MA on career expectation variables are set to zero a priori, however, no empirical test is possible.

For purposes of comparison with previous estimates derived from indirect least squares (ILS) (Table 12), OLS estimates of the model given by equations (1) are displayed in Table 13. Inspection of these data reveal much more credible outcomes than the estimates derived from ILS. Most coefficients are positive as expected, and the few negative coefficients are of small magnitude, only two being significantly less than zero at $p(\alpha) < .05$, with a two-tailed test. Although one might take issue with some specific patterns among the coefficients, none of the results engender incredulity. In all subgroups except black females, measured mental ability (MA) shows the largest effect on academic performance (AP); for black females the expectation variables affect AP. In all four subgroups, parental educational expectation (EEPsp) reveals the dominant effect on the youth's educational expectation (EEsp); an analogous observation generally is true for occupational expectation (i.e., OEPsp$\rightarrow$OEsp) except that AP has a somewhat stronger effect on OEsp than does OEPsp for black males, and girls' own educational expectation (EEsp) has a stronger effect on OEsp for black females than does OEPsp. Generally, the two parental expectation variables (EEPsp and OEPsp) exercise strong effects on each other, and the same is true of the youth (i.e., EEsp$\rightleftarrows$OEsp).

Because of the pervasive idea that OLS is inappropriate in the presence of causal feedback, some further discussion of the issue may be useful. Three main points are raised in the ensuing discussion. First, it is pointed out that there is no deductive proof that if y_1 affects y_2 and y_2 affects y_1, then the disturbance associated with y_1 is automatically correlated with y_2, and vice versa. Secondly, the seldom noted fact is demonstrated tht ILS and related methods are biased and inconsistent when specification of zero coefficients is in error. Finally, the dynamic basis for estimating causal feedback from cross-sectional data is reviewed.

It is believed generally that the presence of causal feedback in a system automatically renders OLS biased and inconsistent. For example, Hout and Morgan state

> Parameters were estimated by two-stage least squares (2SLS) rather than ordinary least squares (OLS), since the latter yield biased and inconsistent estimates of the structural parameters of nonrecursive models... (Hout and Morgan, 1975: 371)

Similarly, the complementary view is expressed succinctly by Freeman: "Since the cobweb model is recursive, the supply equations are estimated by ordinary least squares (Freeman, 1971: 65).

It would be easy to infer from statements of this sort that causal feedback in a system of variables automatically generates nonzero covariances between regressors in a given equation and the disturbance in

TABLE 13

ORDINARY LEAST-SQUARES ESTIMATION OF A MODEL
OF CAREER EXPECTATIONS AND ACADEMIC PERFORMANCE CONTAINING FEEDBACK LOOPS

	Regressand	Intercept	Predetermined Variables		Jointly Dependent Variables					
			SES	MA	AP	EEPsp	OEPsp	EEsp	OEsp	R^2
Panel 1: Black Females N = 187	AP	-.118	-.125	.044	-1.0	.055	.296*	.176*	.219*	.225
	EEPsp	.037	.031	.132*	.043	-1.0	.400*	.498*	-.130	.441
	OEPsp	.161	.065	.094*	.126*	.221*	-1.0	-.054	.300*	.380
	EEsp	-.125	.073	-.070	.112*	.411*	-.081	-1.0	.621*	.525
	OEsp	.331	.058	.142*	.071*	-.055	.229*	.316*	-1.0	.481
Panel 2: White Females N = 177	AP	.045	.064	.367*	-1.0	.037	.075	.184*	.104	.336
	EEPsp	-.134	.126*	.094*	.018	-1.0	.433*	.307*	.018	.621
	OEPsp	.131	.050	.093*	.028	.345*	-1.0	.026	.402*	.654
	EEsp	-.110	.091	-.067	.132*	.464*	.049	-1.0	.242*	.499
	OEsp	.031	-.154†	-.005	.062	.022	.633*	.201*	-1.0	.531
Panel 3: Black Males N = 172	AP	-.052	-.007	.154*	-1.0	-.020	.207*	.145*	.278*	.327
	EEPsp	.064	.105	.025	-.017	-1.0	.345*	.457*	.084	.523
	OEPsp	-.133	.117*	.029	.160*	.308*	-1.0	.123*	.194*	.485
	EEsp	.136	-.032	-.019	.119*	.434*	.131*	-1.0	.152*	.474
	OEsp	.013	.002	.153*	.243*	.085	.212*	.162*	-1.0	.405
Panel 4: White Males N = 178	AP	-.266	-.076	.489*	-1.0	.187*	.083	.164*	-.022	.531
	EEPsp	.141	.077	-.130†	.129*	-1.0	.426*	.276*	.055	.686
	OEPsp	-.136	.023	.125*	.076	.564*	-1.0	.053	.325*	.716
	EEsp	-.079	.125*	.047	.141*	.344*	.050	-1.0	.224*	.608
	OEsp	-.303	-.005	.182*	-.025	.093	.412*	.302*	-1.0	.608

*Significantly greater than zero at p (α) ≤ .05, one-tailed test

†Significantly less than zero at p (α) ≤ .05, two-tailed test

An equation such as (14b) can be translated into this notation as follows:

(17) $y = \underline{x}'\underline{a} + u$

The OLS solution for $\underline{a}$ is given by vector differentiation of the expected value of the squared errors and setting to zero:

$$\frac{\partial Eu^2}{\partial \underline{a}} = \frac{\partial E(y-\underline{x}'\underline{a})^2}{\partial \underline{a}} = -2E(y-\underline{x}'\underline{a})\underline{x}$$

$$\underline{o} = -2(E\underline{x}y - E\underline{x}\underline{x}'\underline{a})$$

(18) $\underline{a}_{OLS} = (E\underline{x}\underline{x}')^{-1}E\underline{x}y$

The zero first derivatives comprise necessary conditions for the minimum. Analysis of the second derivatives demonstrates that (18) is also a sufficient condition, but that demonstration is omitted here (see, e.g., Anderson, 1958).

Now, premultiply (17) by $\underline{x}$ and take expectations on both sides, to find:

$$Ey\underline{x} = E\underline{x}\underline{x}'\underline{a} + E\underline{x}u$$

(19) $\underline{a} = (E\underline{x}\underline{x}')^{-1} Ey\underline{x} - (E\underline{x}\underline{x}')^{-1} E\underline{x}u$

Note that the difference between the OLS solution for $\underline{a}$ ($\underline{a}_{OLS}$) and the true $\underline{a}$ is just:

(20) $\underline{a}_{OLS} - \underline{a} = (E\underline{x}\underline{x}')^{-1}E\underline{x}u$

(found by subtracting [19] from [18]). Clearly, any sampling functions that are consistent estimators of $\underline{a}_{OLS}$ will be biased and inconsistent estimators of the true $\underline{a}$, unless $(E\underline{x}\underline{x}')^{-1}$ $E\underline{x}u = \underline{o}$. In particular, the sample OLS calculations are consistent estimators of $\underline{a}_{OLS}$ and are, therefore, biased and inconsistent estimators of the true $\underline{a}$, unless the regressors are uncorrelated with the disturbance (i.e., $E\underline{x}u = \underline{o}$). The asymptotic bias of OLS sample estimators is given by (20).

It is not surprising to find that nonOLS calculations also are biased and inconsistent if wrong assumptions are made, but this fact is so seldom cited that it seems advisable to derive the asymptotic bias and compare it to the bias of OLS. When it is not possible to assume that $E\underline{x}u = \underline{o}$, the typical alternative is to draw on theory to set selected elements in $\underline{a}$ to zero. If a sufficient number of coefficients are zero, then $\underline{a}$ can be identified. Let $\underline{a}$ be partitioned into two vectors, $\underline{a}_1$ corresponding to nonzero entries and $\underline{a}_2$ corresponding to zero entries. Partition $\underline{x}$ in the analogous manner, with $\underline{x}_1$ corresponding to variables presumed to affect y, and $\underline{x}_2$ corresponding to variables having no (direct) effect on y. The structural equation (17) can be written in the new notation as follows:

(21) $y = \underline{x}_1'\underline{a}_1 + \underline{x}_2'\underline{a}_2 + u$

(21a) $y = x_1'\underline{a}_1 \qquad + u$

since $\underline{a}_2 = \underline{o}$, by assumption. If $E\underline{z}u = \underline{o}$, then

(22) $E\underline{z}y = E\underline{z}\underline{x}_1'\underline{a}_1$

A necessary condition for (22) to have a unique solution is for $\underline{z}$ to contain at least as many elements as $\underline{x}_1$; then, $\underline{a}_1$ is said to be identified. Assuming no linear dependencies among the z's or among the x's, if the order of $\underline{z}$ is the same as the order of $\underline{x}_1$, $\underline{a}_1$ is just identified; if the order of $\underline{z}$ exceeds the order of $\underline{x}_1$, then $\underline{a}_1$ is overidentified. Since the assumptions are presumed to be mathematically consistent (as opposed to statistically consistent), the number of rows by which the order of $\underline{z}$ exceeds the order of $\underline{x}_1$ can be dropped from $\underline{z}$. No information is lost, since reference is to the population and one can ignore sampling error that might generate minor mathematical inconsistency in specific samples even when none occurs in the population.

In view of these considerations, one may assume for the population that $(E\underline{z}\underline{x}_1')^{-1}$ exists and obtain $\underline{a}_1$ directly from (22).

(22a) $\underline{a}_1 = (E\underline{z}\underline{x}_1')^{-1} E\underline{z}y$

Any sampling functions such as indirect least squares, two-stage least squares, three-stage least squares, or the maximum likelihood functions that consistently estimate $\underline{a}_1$ will be consistent sample estimators, so long as the assumption that $\underline{a}_2 = \underline{o}$ is true.

Now, consider the effects of incorrectly assuming $\underline{a}_2$ is zero, so that (21a) is the presumed structural equation when (21) with $\underline{a}_2 \neq \underline{o}$ is the true equation. Suppose that some estimation method is used that consistently estimates

(22b) $\underline{a}_1{}^* = (E\underline{z}\underline{x}_1')^{-1} E\underline{z}y$

If $\underline{a}_2$ is not zero, then the true $\underline{a}_1$ is

$$\underline{a}_1 = (E\underline{z}\underline{x}_1')^{-1}E\underline{z}y - (E\underline{z}\underline{x}_1')^{-1}(E\underline{z}\underline{x}_2')\underline{a}_2$$

$$\underline{a}_1 = \underline{a}_1{}^* + (E\underline{z}\underline{x}_1')^{-1}(E\underline{z}\underline{x}_2')\underline{a}_2$$

(23) $\underline{a}_1{}^* - \underline{a}_1 = (E\underline{z}\underline{x}_1')^{-1}(E\underline{z}\underline{x}_2')\underline{a}_2$

where the assumption $E\underline{z}u = \underline{o}$ is retained. Assuming $(E\underline{z}\underline{x}_2')$ is full rank and $E\underline{z}u = \underline{o}$, $\underline{a}_1{}^* = \underline{a}_1$ if and only if $\underline{a}_2 = \underline{o}$. Any sample estimators that consistently estimate $\underline{a}_1{}^*$, will be inconsistent, biased estimators of

the true set of coefficients, $\underline{a}_1$, and the asymptotic bias is given by (23).

Equation (20) gives the asymptotic bias of sample OLS estimators, and (23) gives the asymptotic bias of consistent sample estimators of $\underline{a}_1^*$, under the assumption that $E\underline{z}u = \underline{o}$. Comparison of the two equations suggests an interesting conclusion, viz, that OLS is likely to be less sensitive to misspecification than estimators such as ILS, 2SLS, etc. that estimate $\underline{a}_1$. The reason is that the determinant of the cross-products matrix in (20), $E\underline{x}\underline{x}'$ generally will be larger (relative to the largest entry in the matrix) than the determinant of $E\underline{z}\underline{x}_1'$. The likely difference in these determinants derives from the fact that the diagonal entries of $E\underline{x}\underline{x}'$ dominate the matrix, but this is not true of $E\underline{z}\underline{x}_1'$. Since inverse matrices can be written as a function involving the reciprocal of the determinant of the matrix, the deviations from zero of $E\underline{x}u$ in (20) get multiplied by a smaller number than the deviations from zero of the entries in $\underline{a}_2$ (see equation [23]). This comment still applies even if one drops the assumption that $E\underline{z}u = \underline{o}$. The general asymptotic bias of consistent estimators of $\underline{a}_1^*$ is

$$\underline{a}_1^* - \underline{a}_1 = (E\underline{z}\underline{x}_1')^{-1}[(E\underline{z}\underline{x}_2')\underline{a}_2 + E\underline{z}u]$$

It is well known that the sampling variance of nonOLS estimators tends to exceed that of OLS estimators (Goldberger, 1964: 360). The reason is contained in the fact that $(E\underline{z}\underline{x}_1')^{-1}$ appears in the asymptotic variance-covariance matrix of the sample estimates of $\underline{a}_1$. For indirect least squares (and just identified models) two-stage least squares, and maximum likelihood, limited information estimators, that asymptotic variance-covariance matrix is

$$\Sigma_{\hat{\underline{a}}_1\hat{\underline{a}}_1} = \frac{s^2}{N} (E\underline{z}\underline{x}_1')^{-1}(E\underline{z}\underline{z}')(E\underline{x}_1\underline{z}')^{-1}$$

where s^2 is the variance of the disturbance, and $\hat{\underline{a}}_1$ is the sample estimate of $\underline{a}_1$. Note that the variance of each estimator in $\hat{\underline{a}}_1$ is a function of the square of the reciprocal of the determinant of $E\underline{z}\underline{x}_1'$, and the standard error is, therefore, a function of the reciprocal of that determinant.

The general conclusion is apparent. NonOLS methods generally are more sensitive to specification error (sensitivity determined by the magnitude of the asymptotic bias) than OLS. Couple this fact with the larger sampling variances of most nonOLS methods, and the conclusion is clear: one should demand strong theoretical grounds before using any of the main alternatives to OLS. The results of the empirical examples shown in this chapter support this conclusion.

As noted in the opening chapter to this report, the theoretical model underlying the research study is expressed as a system of linear differential equations. The differential equations reflect the often cited continuity and feedback features of the development of career expectations

(see Hotchkiss, 1979a). The differential equations supply a model for change, not for cross-sectional relationships. Nevertheless, the connection between change over time and the cross-sectional relations provides important insights into the identification problem under discussion here.

A system of first-order ordinary linear differential equations with constant coefficients expressing the dynamic analogue of equations (1) can be written in the following form

(24) $d\underline{y}/dt = \underline{B}\underline{y} + \underline{C}\underline{z} + \underline{u}$

where $d\underline{y}/dt$ is a Kx1 vector of derivatives containing the rates of change with respect to time in the career expectation variables and academic performance, $\underline{B}$ is a KxK matrix of constant coefficients over time, $\underline{y}$ is a Kx1 vector of current values for the endogenous variables, $\underline{C}$ is a Kx(L+1) matrix of constant coefficients, $\underline{z}$ is an (L+1)x1 vector with its first element identically equal to 1.0 and the remaining elements with observations on the L exogenous variables, and $\underline{u}$ is a Kx1 vector of disturbances. In the present example, K = 5 (AP, EEP, OEP, EE, OE), and L = 2 (SES, MA).

Equation (24) is not in a form that can be observed directly, since the vector of derivatives $d\underline{y}/dt$ appears in it. If one assumes $\underline{B}$ is full rank, then integration of (24) yields an observable form:

(25) $\underline{y}_t = e^{\underline{B}t}\underline{y}_o + (e^{\underline{B}t}-\underline{I})\underline{B}^{-1}\underline{C}\underline{z} + \underline{v}_t$

where $\underline{y}_t$, $\underline{y}_o$ are vectors of observations on the endogenous variables at time = t and time = 0, respectively, $e^{\underline{B}t}$ is the matrix exponential (to be distinguished from elementwise exponential), $\underline{v}_t$ is a vector of K disturbances, and the other symbols are defined as for equation (24).[9]

Generally, the real part of the largest characteristic root of $\underline{B}$ can be assumed to be negative. When this assumption holds, the matrix exponential $e^{\underline{B}t}$ tends to zero as t goes to infinity. Under this circumstance $e^{\underline{B}t}$ can be dropped from (25), which then simplifies to

(26) $\underline{y} = -\underline{B}^{-1}\underline{C}\underline{z} + \underline{v}$

where, for simplicity the time subscripts on $\underline{y}$ and $\underline{v}$ have been dropped.

[9]For expository review of the connection between equation (24) and (25), see Coleman (1968), Doreian and Hummon (1976), or the first monograph related to this study (Hotchkiss, 1979a, in press). For a mathematical treatment, see Platt (1971), for example.

Note that (26) is the reduced-form equation (3).[10] Premultiplying by $\underline{B}$ leads to the structural equation (2), i.e.,

$$\underline{0} = \underline{B}\underline{y} + \underline{C}\underline{z} + \underline{u}$$

with redefined $\underline{u} = -\underline{B}\underline{v}$. It is important to notice that even when the assumptions required to generate (26) from (25) are met, the structure is identified only to a constant of proportionality, with that proportionality constant varying from one equation to the next. Thus, the best that can be obtained from cross-sectional estimates falls just short of complete identifiation of the structure of the differential equations.[11]

Viewing the problem of identifying the simultaneous structural equations for cross-sectional data as an effort to estimate (constant multiples of) the structure of a differential equation system leads naturally to some examination of the manner in which the behavior of the disturbance over time might affect the method of estimation. Due to shortage of time and space, however, this investigation is postponed for future work. It is concluded that this investigation is an important effort, because it seems likely that the form of the covariance matrix between endogenous variables can be deduced from certain assumptions about the behavior of the disturbances over time. It is possible in this circumstance that estimation methods superior to any reviewed here for calculating all possible feedback coefficients could be found.

Summary

This chapter began with the observation that the recursive models of the previous chapter are inconsistent with pursuasive theory that causal feedback is present among all career-expectation variables and academic performance. This discrepancy between theory and method generated a lengthy discussion of the identification issue in structural equation systems, since it is assumed widely that ordinary least-squares (OLS) provides inconsistent estimates when causal feedback is present. Upon investigation, however, it

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[10] Although this view has not been expressed so often in recent years, it is still worth noting that numerous essays in the econometric literature refer to the structural coefficients as "more fundamental" than the reduced-form coefficients ($\underline{P} = -\underline{B}^{-1}\underline{C}$), because the structural coefficients generate the reduced form (see Goldberger [1973], Marschak [1953], Christ [1966], or Hurwicz [1950]). The analysis in the text gives a somewhat different interpretation of the structural coefficients and how they generate the reduced form, but the mathematical form in this report is identical to the econometric treatments.

[11] This is a slight generalization of an observation made by Coleman (1968) regarding a single differential equation under the equilibrium assumption.

was found that OLS estimates are not necessarily inconsistent even in the presence of feedback. It was also shown that alternatives to OLS produce inconsistent estimates when some coefficients of the structure are set incorrectly to zero. Analysis of the asymptotic bias of OLS and nonOLS methods when these types of assumptions are violated, showed that the asymptotic bias of nonOLS methods usually will be more sensitive to specification error than OLS estimates.

Interpreting structural estimation from cross-sectional data as estimation of the parameters of a differential equation system (up to a constant of proportionality in each equation) suggested that the hypothesis of diagonal covariance matrix between endogenous variables and disturbances may be threatened by the manner in which disturbances behave over time. No solution to this problem was proposed, but the importance of working or it was emphasized.

The chapter also contains two sets of estimates of all possible feedback loops among the endogenous variables. The first set was calculated by indirect least squares. The results were not credible. Coefficients fluctuated wildly from variable to variable and followed no interpretable pattern. Few coefficients were statistically significant. Estimates based on OLS, on the other hand, yielded interpretable results and many coefficients were statistically significant. This exercise obviously cannot prove the consistency of OLS, but it does show that OLS may yield outcomes that are more consistent with theory than results calculated by conventional alternatives.

CHAPTER 5

SUMMARY AND CONCLUSIONS

This report is part of a three-year longitudinal study of the process by which high-school age youth form career expectations. Chapter 1 reviews the theoretical orientation of the study and the overall plan. It is noted that the study draws on a cross-sectional path model of career expectations drawn from the sociological literature on status attainment. The study is designed around a dynamic generalization of the cross-sectional model, one based on differential equations in which all expectation variables are viewed as affecting each other in a time-continuous system of feedback loops.

The second chapter reports on the methods of the study. A sample of some 700 high school youth was drawn at random from the roster of local public high school sophomores during the 1978-1979 school year. This sample is balanced by race and sex. Interviewers were sent to respondents' homes to deliver and supervise completion of self-administered questionnaires. The sophomore youth and one or both parents each completed questionnaires. All occupational data were coded into three-digit 1970 census codes and then transformed into Duncan SEI codes, reflecting socioeconomic content of occupations. This aspect of the study reflects one of the fundamental characteristics of the sociological model. In the authors' view, characterizing occupations solely on the status dimension is unduely constraining and needs to be relaxed.

Chapter 3 reports several analyses derived from the first panel of data. Selected means, standard deviations, correlations and path models are compared to previous cross-sectional research in the local area. These comparisons reveal good matches between current and past samples in broad patterns, but the samples differ in specific detail. Also, a small number of demographic variables from the current sample are compared to the most recent previous local sample and to the 1970 census. These comparisons included education of parents, age of parents, and family type (broken, intact). The age distributions showed no significant differences when compared to several census regions or to the previous local sample. Family type differed significantly and substantially from the census but not from the previous sample. The higher rate of nonintact families among both recent samples than in the 1970 census may be due to a real trend rather than sampling error. Both samples show somewhat smaller percentage of high school graduates than the 1970 census; those from the previous sample are not statistically significantly different from the census, whereas, those from the current sample are. The two samples, with one exception, were not

found to differ from each other by a statistically significant amount. This apparent anomaly is attributable to the larger sample size in the current sample. Also, the difference in age distribution of parents of high school students from the general population may account for some of the difference from the census data.

Chapter 3 also reports correlations among career expectation variables based on a new measurement method, here termed subjective-probability measurements. Comparison of correlations based on the subjective-probability method to those derived from traditional methods reveal encouraging results. The former were observed to be consistently higher than the latter, in several instances dramatically so. The subjective-probability measures especially improve correlations involving occupational expectation (as compared to educational expectation).

Chapter 4 investigates the identification issue in cross-sectional data in which feedback loops appear. The idea that OLS estimates in the presence of feedback necessarily are biased and inconsistent is shown to be inaccurate. Causal feedback alone is insufficient to invalidate the assumptions required for OLS estimates to be consistent. Investigation of alternative estimation techniques such as two-stage least squares shows that they too are inconsistent where incorrect assumptions are made. This is not surprising, but it is a little noted fact. Comparison of the inconsistency due to OLS when regressors are correlated with disturbances to inconsistency of other methods when parameters of the structure are assumed incorrectly to be zero suggests that OLS is less sensitive to specification error than most standard alternatives. Analysis of the dynamic basis for estimating the structure from cross-sectional data suggests caution in applying OLS, however, since the behavior of disturbances over time may invalidate the assumptions necessary for OLS.

APPENDIX A

QUESTIONNAIRES FOR PANEL ONE

Introduction

This appendix reproduces the questionnaires used during data collection for panel one. The original page numbers on each questionnaire appear in the upper right corner; the page number for this volume is at the bottom of the page. All references to the questionnaires are by form number and original page number.

One pair of questionnaires was completed by each respondent. Form number by type of respondent is shown below:

Form 1-- Estimating the chances: Sophomore's Form (completed by youth)

Form 2-- Survey of Sophomores, Part II: Career Aspirations

Form 3/5-- Estimating the chances: Parents' Form (Form 3 completed by mother; Form 5 completed by fathers)

Form 4/6-- Survey of Mothers: Career Aspirations (Form 4 completed [illegible] mothers; Form 6 compl[illegible] by fathers)

Form 3 is identical to form 5, and form 4 is nearly identical to form 6; hence only one reproduction of these pairs is included.

Form 1
Panel 1

THE NATIONAL CENTER
FOR RESEARCH IN VOCATIONAL EDUCATION

The Ohio State University · 1960 Kenny Road · Columbus, Ohio 43210
Tel (614) 486 3655 Cable CTVOCEDOSU/Columbus, Ohio

ESTIMATING THE CHANCES

SOPHOMORE'S FORM

Form 1

THE NATIONAL CENTER
FOR RESEARCH IN VOCATIONAL EDUCATION

The Ohio State University · 1960 Kenny Road · Columbus, Ohio 43210
Tel (614) 486 3655 Cable CTVOCEDOSU/Columbus, Ohio

WHY YOU ARE IMPORTANT!!

This survey is part of research that we are doing on how young people think about jobs and careers. Your answers to our questions will give us a better understanding of how people get into different occupations. In turn, this understanding will allow us to help people choose careers that are best for them. As a result, you are a very important part of this study! We realize that the future is never certain and that you may not have thought about it very much, but everyone has some ideas. We ask you to share them with us.

There are three important things we would like you to keep in mind as you answer the questions:

1. Please be sure your answers are as accurate as you can make them. Your care and thought can help to improve the quality of vocational programs designed to help youth.

2. Please read carefully all directions. Some of the questions are not very easy. Please ask if you have any doubt about what to do.

3. Please be sure to answer all questions that apply to you. When you leave out even one question, it makes it hard or impossible for us to use your other answers. Every question has been carefully selected. We believe that your time is too valuable to be wasted on questions that are not important.

Please note that when these questionnaires leave your house, no one will be allowed to see how you answered any question -- your answers are strictly confidential. DO NOT put your last name on any questionnaire.

We thank you for helping us.

SECTION I

OCCUPATION

1. We recognize that it is hard for high school students to be sure about their future careers. In this questionnaire, therefore, we ask you to guess at your chances of going into different occupations, getting different levels of education, and making different amounts of income. Of course, you may not be sure about your chances either, but please give us your best guess for every question. [1:08]

   a. Please check one of the following: I am a ☐ male ☐ female

   b. The next few pages contain a list of jobs on the left side and a measuring line to the right of each job. The interviewer will explain how to fill out this section using the example below.

Example

Please estimate the chance of living most of your life in each of the following states:

Ohio	0 ——————————————— 100
Colorado	0 ——————————————— 100
Florida	0 ——————————————— 100
Maine	0 ——————————————— 100

   c. Don't worry if most of your checks are zero or close to zero. This is normal and expected.

   d. If you have any questions, ALWAYS feel free to ASK the interviewer.

Form 1

NAME OF JOB	CHANCE YOU WILL BE IN THIS JOB (Place one check on each line)
Military officer [1:11]	0 — 100
Military enlisted person, not an officer [1:14]	0 — 100

NOTE: The remaining jobs are civilian jobs only.

NAME OF JOB	CHANCE YOU WILL BE IN THIS JOB
Accountant [1:17]	0 — 100
Architect [1:20]	0 — 100
Computer specialist (such as programmer) [1:23]	0 — 100
Forester or conservationist [1:26]	0 — 100
Judge [1:29]	0 — 100
Librarian or curator	0 — 100
Physical scientist such as geologist or astronomer, but not an engineer, or a college professor [1:35]	0 — 100
Engineer such as chemical engineer or electrical engineer, but not a college professor	0 — 100
Social scientist, such as psychologist, economist, or sociologist, but not a college professor [1:41]	0 — 100

NAME OF JOB	CHANCE YOU WILL BE IN THIS JOB (Place *one* check on *each* line)
Biological or agricultural scientist, but not a college professor [1:44]	0 100
Lawyer (but not a college professor) [1:47]	0 100
Physical, speech, or occupational therapist	0 100
Airplane pilot [1:53]	0 100
Air traffic controller or radio operator [1:56]	0 100
Flight engineer [1:59]	0 100
Designer, including designer of clothes, pottery, rugs, interior decorating, glassware	0 100
Bank officer or financial manager [1:65]	0 100
Funeral director or embalmer [1:68]	0 100
In[illegible]or such as building sa[illegible], inspector or bank examiner [1:71]	0 100

NAME OF JOB	CHANCE YOU WILL BE IN THIS JOB (Place one check on each line)
Writer or author (fiction or nonfiction), journalist, reporter, editor, public relations person or publicity writer	0 ——— 100
Postmaster or mail superintendent, sales manager, or health administrator	0 ——— 100
Railroad conductor, officer or pilot of a ship, building manager or superintendent *[2:08]	0 ——— 100
Storekeeper or restaurant, cafeteria, or bar manager [2:11]	0 ——— 100
Corporation executive or college administrator such as college dean	0 ——— 100
Receptionist or office machine operator such as computer, keypunch or telephone operator	0 ——— 100
Stenographer, clerical work such as file, postal, or stock clerk [2:20]	0 ——— 100
Blacksmith or boilermaker [2·23]	0 ——— 100

NAME OF JOB	CHANCE YOU WILL BE IN THIS JOB (Place one check on each line)
Operator of earth moving machinery and other heavy machinery such as bulldozer, grader, or crane [2:26]	0 ——— 100
Carpentry work such as cabinet maker or house-builder [2:29]	0 ——— 100
Bookbinder or typesetter in a print shop or related work [2:32]	0 ——— 100
Jeweler, watchmaker, machinist, optician, grinder, or polisher	0 ——— 100
Tailor or upholsterer	0 ——— 100
Tool and die maker [2:41]	0 ——— 100
Garage worker or gas station attendant [2:44]	0 ——— 100
Meatcutter, butcher, baker, or related work	0 ——— 100
Operator of a precision machine such as lathe, drillpress, milling machine, or grinder	0 ——— 100
Textile worker such as weaver [2:53]	0 ——— 100

NAME OF JOB	CHANCE YOU WILL BE IN THIS JOB (Place <u>one</u> check on <u>each</u> line)
High school or grade school administrator such as principal or superintendent [2:56]	0 ——— 100
Other administrator or manager such as union officer, office manager . [2:59]	0 ——— 100
Bank teller, cashier in a store, or bookkeeper	0 ——— 100
Vehicle dispatcher, such as taxicabs or police cars [2:65]	0 ——— 100
Insurance adjuster, examiner, or investigator	0 ——— 100
Mail carrier, deliveryman, routeman or reader of gas or electric meters [2:71]	0 ——— 100
Auctioneer [2:74]	0 ——— 100
Insurance agent or underwriter [2:77]	0 ——— 100
Real estate agent or appraiser *[3:08]	0 ——— 100
Stock and bond salesman	0 ——— 100

NAME OF JOB	CHANCE YOU WILL BE IN THIS JOB (Place one check on each line)
Sales clerk in a store or other salesperson [3:14]	0 ——— 100
Medical secretary [3:17]	0 ——— 100
Secretary (except medical secretary) [3:20]	0 ——— 100
Railroad brakeman or railroad switchman [3:23]	0 ——— 100
Garbage collector [3:26]	0 ——— 100
Longshoreman, stevedore, sailor, or deckhand	0 ——— 100
Lumberman or related work such as working in a sawmill or miner, such as coal miner or other mine work [3:32]	0 ——— 100
Operator of a machine such as riviter, photo developer, welder [3:35]	0 ——— 100
Farmer or farm manager, farm foreman [3:38]	0 ——— 100
Farm laborer or self-employed farm service worker such as sheep shearer or combine operator [3:41]	0 ——— 100
Cleaning service worker in a business such as a hotel but not a private home -- such as janitor, cleaning woman, maid [3:44]	0 ——— 100

NAME OF JOB	CHANCE YOU WILL BE IN THIS JOB (Place <u>one</u> check on <u>each</u> line)
Food service worker such as bartender, busboy in a hotel, dishwasher, food counter or fountain worker or waiter or waitress	0 ——————————— 100
Protective service worker such as fireman, policeman, detective, sheriff, or bailiff [3:50]	0 ——————————— 100
Worker in a family home -- such as cook, child care worker, housekeeper, maid, or butler [3:53]	0 ——————————— 100
Personal service worker such as airline stewardess baggage porter or bellhop, barber, boarding and lodging housekeeper, elevator operator, hairdresser or cosmetologist, usher [3:56]	0 ——————————— 100
Medical doctor or dentist [3:59]	0 ——————————— 100
Registered nurse or dietitian [3:62]	0 ——————————— 100
Optometrist (eye doctor)	0 ——————————— 100
Pharmicist or druggist	0 ——————————— 100
Veterinarian [3:71	0 ——————————— 100

Form 1

NAME OF JOB	CHANCE YOU WILL BE IN THIS JOB (Place one check on each line)
Chiropractor; podiatrist (foot doctor) [3:74]	0 ——— 100
Minister, priest, or rabbi (or other clergyman)	0 ——— 100
Other religious worker	0 ——— 100
Social worker, recreation worker [4:11]	0 ——— 100
Elementary school teacher (including Kindergarten and preschool) [4:14]	0 ——— 100
High school teacher, vocational or educational counselor [4:17]	0 ——— 100
Other type of teacher	0 ——— 100
Engineer such as chemical or electrical engineer, science technician, surveyor or draftsman	0 ——— 100
Health service worker with no college training such as practical nurse, medical technician, or dental assistant [4:26]	0 ——— 100
Locomotive engineer or fireman [4:29]	0 ——— 100

NAME OF JOB	CHANCE YOU WILL BE IN THIS JOB (Place one check on each line)
Auto mechanic or repairman of heavy equipment	0 100
Household appliance, radio, television, or other mechanic or repairman [4:35]	0 100
Motion picture projectionist [4:38]	0 100
House painter or plasterer [4:41]	0 100
Piano or organ tuner or repairman [4:44]	0 100
Brick layer, electrician, plumber or related work	0 100
Sheetmetal worker or tinsmith [4:50]	0 100
Shoe repairman or shoemaking machine operator	0 100
Sign painter or letterer	0 100
College teacher or professor of sciences such as: physics, chemistry, astronomy, mathematics, geology, biology, agriculture, medicine, dentistry, pharmacy, or veterinary medicine	0 100

NAME OF JOB	CHANCE YOU WILL BE IN THIS JOB (Place <u>one</u> check on <u>each</u> line)
College teacher or professor of nonsciences such as: psychology, economics, sociology, political science, law, history, English, language, education, business, commerce, industrial arts, sport coach or physical education, art, drama, music [4:62]	0 ———————— 100
Entertainer or artist such as actor, dancer, musician, composer, painter, sculptor, photographer, radio or TV announcer, professional athlete [4:65]	0 ———————— 100
Other skilled or semi-skilled craftsman, such as carpet installer, wallpaper hanger, foreman, telephone installer, repairman or lineman	0 ———————— 100
Transport equipment operator such as parking attendant, bus driver, conductor or motorman as mass rail transport, taxicab driver, chauffer, or truck driver [4:71]	0 ———————— 100

This list does not contain all possible occupations. If there are any other jobs you think you might have as a main job which were not in this list, please write them on the left side and rate your chances on the right.

NAME OF JOB	CHANCE YOU WILL BE IN THIS JOB (Place one check on each line)
[4:74]	0 ———— 100
[4:77]	0 ———— 100
*[5:08]	0 ———— 100
[5:11]	0 ———— 100
[5:14]	0 ———— 100
[5:17]	0 ———— 100
[5:20]	0 ———— 100
[5:23]	0 ———— 100

PLEASE CONTINUE ON TO THE NEXT PAGE

SECTION II

INCOME

3. Different income ranges are listed below next to measuring lines. Please rate the chance that each of the income ranges includes the highest total yearly income (not just take-home pay) you will ever make. Assume the VALUE OF THE DOLLAR DOESN'T CHANGE.

Use the same method you did for jobs.

a. Put one check on each line

b. Place the check so that the farther to the right it is, the higher your chance is

c. Again, since only one income range can include the highest income you will ever make, if you check very high on one, the rest necessarily must be low

IF YOU HAVE ANY QUESTIONS, PLEASE ASK

$ PER YEAR	CHANCE THIS WILL BE THE HIGHEST INCOME YOU WILL EVER MAKE (Place one check on each line)	
Under $4,000	0 100	[5:26]
4,000 - 5,999	0 100	[5:29]
6,000 - 7,999	0 100	[5:32]
8,000 - 9,999	0 100	[5:35]
10,000 - 11,999	0 100	[5:38]
12,000 - 14,999	0 100	[5:41]
15,000 - 19,999	0 100	[5:44]
20,000 - 24,999	0 100	[5:47]
25,000 - 29,999	0 100	[5:50]
30,000 - 34,999	0 100	[5:53]
35,000 - 39,999	0 100	[5:56]
40,000 - or more	0 100	[5:59]

SECTION III

EDUCATION

4. Different levels of regular schooling are listed below next to measuring lines. Please rate the chance that each one will be the <u>highest level of regular school you will ever attend or complete</u>. (Regular school excludes specialized training such as those listed in the next question.)

Use the same method you used for jobs and income.

a. Place <u>one</u> check on <u>each</u> line

b. Place the check so that the farther to the right it is, the <u>higher</u> you think your chance is

c. Since only one grade can be the highest you will ever attend, if you check very high on one, the rest must necessarily be low

REGULAR SCHOOL LEVEL	CHANCE THIS WILL BE HIGHEST LEVEL ATTENDED (Place <u>one</u> check on <u>each</u> line)	
High school sophomore	0 ——————————— 100	[5:62]
High school junior	0 ——————————— 100	[5:65]
High school senior	0 ——————————— 100	[5:68]
College freshman	0 ——————————— 100	[5:71]
College sophomore	0 ——————————— 100	[5:74]
College junior	0 ——————————— 100	[5:77]
College senior	0 ——————————— 100	*[6:08]
Master's degree	0 ——————————— 100	[6:11]
Ph.D. or professional degree	0 ——————————— 100	[6:14]

5. Different types of special training are listed below next to measuring lines. Please rate the chance that you will complete each one.

   a. Place one check on each line

   b. Place the check so that the farther to the right it is, the higher you think your chance is

   c. Since it is possible that you may complete more than one kind of special educational training, you can have more than one high check

IF YOU HAVE ANY QUESTIONS, PLEASE ASK

TYPE OF SPECIAL SCHOOLING	CHANCE OF COMPLETION (Place one check on each line)	
Nursing school (for RN's only)	0 ———————— 100	[6:17]
Trade or craft such as mechanic, electrician, beautician, etc.	0 ———————— 100	[6:20]
Business or office work	0 ———————— 100	[6:23]
Science or engineering technology such as draftsman	0 ———————— 100	[6:26]
Agricultural school	0 ———————— 100	[6:29]
Home economics school	0 ———————— 100	[6:32]
Real estate	0 ———————— 100	[6:35]
Other, please specify ____________ ____________	0 ———————— 100	[6:38]

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Form 2
Panel 1

SURVEY OF SOPHOMORES

PART II

CAREER ASPIRATIONS

SECTION I

BACKGROUND INFORMATION

Although the questions in this section are not directly related to your future career, they are vitally important to us. Please answer every question, even if you are not sure.

For all questions about your mother and father, please answer for the persons who are most like parents to you whether or not they are your real mother and father.

1. What is your sex? (Check below) [1:08]

   ☐ 1. Female

   ☐ 2. Male

2. Is your race: (Check below) [1:09]

   ☐ 1. Black

   ☐ 2. White

   ☐ 3. Other, please specify ______________________

3. What is your birthday?

________	________	________
month	day	year
[1:10-11]	[1:12-13]	[1:14-15]

4. To the best of your knowledge, what is the highest grade of regular school your mother and your father each finished and got credit for? Please check one on the left for your mother and one on the right for your father.

Mother	Father	Level of Regular School
☐	☐	0. Less than 1st grade
☐	☐	1. 1st grade
☐	☐	2. 2nd grade
☐	☐	3. 3rd grade
☐	☐	4. 4th grade
☐	☐	5. 5th grade
☐	☐	6. 6th grade
☐	☐	7. 7th grade
☐	☐	8. 8th grade
☐	☐	9. High school freshman
☐	☐	10. High school sophomore
☐	☐	11. High school junior
☐	☐	12. High school graduate
☐	☐	13. College freshman
☐	☐	14. College sophomore
☐	☐	15. College junior
☐	☐	16. College graduate (Bachelor's degree)
☐	☐	17. Master's degree
☐	☐	18. Ph.D. or professional degree such as medicine, law, or dentistry

[1:16-17]

[1:18-19]

5. Besides regular schooling, what type of special schooling, if any, did your mother and father finish and get credit for? Please check one on the left for your mother and one on the right for your father.

Mother	Father	Level of Special School	
☐	☐	0. None	[1:20-21]
☐	☐	1. Nursing school (for RN's only)	[1:22-23]
☐	☐	2. Trade or craft such as mechanic, electrician, beautician, etc.	[1:24-25]
☐	☐	3. Business or office work	[1:26-27]
☐	☐	4. Science or engineering technology such as draftsman	[1:28-29]
☐	☐	5. Agriculture school	[1:30-31]
☐	☐	6. Home economics school	[1:32-33]
☐	☐	7. Real estate	[1:34-35]
☐	☐	8. Other, please specify ______	[1:36-37]

The following two questions are about your father's work.

6. Is your father working for pay at present? (Check one) [1:38]

☐ 1. Yes (skip to question 7)

☐ 2. No ⟶ If not, in which year did he last work for pay?
If he has never worked, check the box.
______ year last worked OR [1:39-40]

☐ has never worked (skip to question 8) [1:41]

7. What is the name of your father's main occupation or job? (If he is not working now, write the name of his last job.) [1:42-44]

Describe a little about what your father does (did) on this job. That is, what are some of his main duties?

The next two questions are about your mother's work.

8. Is your mother working at present? (Check one) [1:45]

☐ 1. Yes (skip to question 9)

☐ 2. No → If not, in which year did she last work for pay? If she has never worked, check the box.

______ year last worked or [1:46-47]

☐ has never worked (skip to question 10) [1:48]

9. What is the name of your mother's main occupation or job? (If she is not working now, write the name of her last job.) [1:49-51]

Describe a little about what your mother does (did) on this job. That is, what are some of her main duties?

10. To the best of your knowledge, what was your total family income last year? Please check one box beside the appropriate income range. For convenience, each income level is listed as a yearly, monthly, and weekly amount. The figures on each line all give the same income for a year.

> NOTE: Total family income includes all income made by any family member living in your home. It includes not only wages and salaries, but also income from any other place, such as rent, interest, business profits, child support, or welfare payments.

INCOME RANGES

	$ Per Year	Is the same as:	$ Per Month or	$ Per Week
☐ (1)	Under $4,000		Under $333	Under $77
☐ (2)	4,000 to 5,999		333 to 499	77 to 114
☐ (3)	6,000 to 7,999		500 to 666	115 to 152
☐ (4)	8,000 to 9,999		667 to 832	153 to 191
☐ (5)	10,000 to 11,999		833 to 999	192 to 229
☐ (6)	12,000 to 14,999		1,000 to 1,249	230 to 286
☐ (7)	15,000 to 19,999		1,250 to 1,666	287 to 382
☐ (8)	20,000 to 24,999		1,667 to 2,082	383 to 479
☐ (9)	25,000 to 29,999		2,083 to 2,499	480 to 575
☐ (10)	30,000 to 34,999		2,500 to 2,916	576 to 670
☐ (11)	35,000 to 39,999		2,917 to 3,332	671 to 766
☐ (12)	40,000 or more		3,333 or more	767 or more

[1:52-53]

11. Please estimate your parents' ability to help pay for your college or other education after high school if you decide to go. (Check one.)

[1:54]

- ☐ 1. They can easily afford it
- ☐ 2. They can afford it, but would have to sacrifice
- ☐ 3. They cannot afford it at all

SECTION II

QUESTIONS ABOUT YOUR FUTURE CAREER

The questions in this section are about your hopes and expectations for your future career. Please answer every question to the best of your ability, even if you aren't sure.

12. Do you want to go to college? (Please check one.) [1:55]

- ☐ 1. Yes, very much
- ☐ 2. Yes, somewhat
- ☐ 3. Not sure
- ☐ 4. No, prefer not to go
- ☐ 5. No, definitely not

13. What is the highest level of regular school you want to finish? (Please check one.)

[1:56-57]

Level of Regular School

- ☐ 10. High school sophomore
- ☐ 11. High school junior
- ☐ 12. High school graduate
- ☐ 13. College freshman
- ☐ 14. College sophomore
- ☐ 15. College junior
- ☐ 16. College graduate (Bachelor's degree)
- ☐ 17. Master's degree
- ☐ 18. Ph.D. or professional degree such as medicine, law, or dentistry

14. Disregarding what you want, what is the highest level of school you realistically think you will finish? (Please check one.) [1:58-59]

Level of Regular School

- ☐ 10. High school sophomore
- ☐ 11. High school junior
- ☐ 12. High school graduate
- ☐ 13. College freshman
- ☐ 14. College sophomore
- ☐ 15. College junior
- ☐ 16. College graduate (Bachelor's degree)
- ☐ 17. Master's degree
- ☐ 18. Ph.D. or professional degree such as medicine, law, or dentistry

If you checked anything below college freshman, skip to question 16.

15. What subject do you think you most likely will study for your <u>highest level</u> of regular schooling? (Please check one.)

[1:60-61]

- [ ] 1. Business and administration
- [ ] 2. Agriculture
- [ ] 3. Home economics
- [ ] 4. Art (painting, sculpture, theater)
- [ ] 5. Music
- [ ] 6. Biology
- [ ] 7. Black studies
- [ ] 8. English
- [ ] 9. Foreign language
- [ ] 10. History
- [ ] 11. Philosophy
- [ ] 12. Astronomy
- [ ] 13. Chemistry
- [ ] 14. Mathematics
- [ ] 15. Physics
- [ ] 16. Statistics
- [ ] 17. Anthropology
- [ ] 18. Economics
- [ ] 19. Political science
- [ ] 20. Psychology
- [ ] 21. Sociology
- [ ] 22. Journalism
- [ ] 23. Engineering
- [ ] 24. Architecture
- [ ] 25. Law
- [ ] 26. Medicine
- [ ] 27. Dentistry
- [ ] 28. Veterinary medicine
- [ ] 29. Seminary (preachers, priests, rabbis)
- [ ] 30. Pharmacy
- [ ] 31. Social work
- [ ] 32. Elementary education
- [ ] 33. Secondary education
- [ ] 34. Other, please specify ______________

16. Besides regular schooling, what other type of schooling, if any, do you think you most likely will finish? (Please check one.)

Type of Special Schooling

- ☐ 0. None [1:62]
- ☐ 1. Nursing school (for RN's only) [1:63]
- ☐ 2. Trade or craft such as mechanic, electrician, beautician, etc. [1:64]
- ☐ 3. Business or office work [1:65]
- ☐ 4. Science or engineering technology such as draftsman [1:66]
- ☐ 5. Agriculture school [1:67]
- ☐ 6. Home economics school [1:68]
- ☐ 7. Real estate [1:69]
- ☐ 8. Other, please specify ______________________ [1:70]

17. Please list the names of some occupations or types of jobs that you would like to have for your main occupation over most of your life; list at least one, even if you are not sure. Also, please list a few of the most important duties or tasks that you feel people do on each job.

List the occupations in order of your preference, with the one you most want listed first, the one you want second most listed second, and so on.

Name of Occupation	Duties or Tasks of Occupation
1. ______________	______________ [2:08-10]
2. ______________	______________ [2:11-13]
3. ______________	______________ [2:14-16]

18. The last question was about what you would like; this question concerns what you realistically expect. Please give the names and duties or tasks of any occupations that you expect you really might be in as your main occupation over most of your life; list at least one, even if you aren't sure.

Again, please list the occupations roughly in the order of your expectation, with the one you consider most likely listed first, the second most likely listed second, and so on.

Name of Occupation	Duties or Tasks of Occupation	
1. ________	________	[2:17-19]
2. ________	________	[2:20-22]
3. ________	________	[2:23-25]

> The next several questions ask about what kind of life-style you think you will follow as you get older.

19. Do you expect that you will get married someday? (Please check one.) [2:26]

- ☐ 1. Yes, quite sure I will marry
- ☐ 2. Yes, I probably will marry
- ☐ 3. Don't know
- ☐ 4. No, I probably won't marry
- ☐ 5. No, quite sure I won't marry

20. If you do get married what is the youngest age you think you would be when you marry?

________ youngest age [2:27-28]

21. What is the <u>oldest</u> age you think you would be when you get married (if you get married)?

_________ oldest age [2:29-30]

22. What is the <u>fewest</u> number of children you think you are <u>likely</u> to have? (If none, write 0.)

_________ fewest number of children [2:31-32]

23. What is the <u>most</u> number of children you think you are <u>likely</u> to have?

_________ most number of children [2:33-34]

24. What relative amount of energy would you <u>expect</u> to devote to your home life and to your work? (Please check one.)

[2:35]

Relative energy devoted to home and to job

- ☐ 1. Much more energy devoted to home than to job
- ☐ 2. Somewhat more energy devoted to home than to job
- ☐ 3. About the same energy devoted to home as to job
- ☐ 4. Somewhat less energy devoted to home than to job
- ☐ 5. Much less energy devoted to home than to job

The next three questions concern your ideas about your future income. For <u>all</u> these questions, answer as if the <u>VALUE OF THE DOLLAR STAYS THE SAME AS IT IS NOW</u>. All three questions refer to the time in your life when you will make your highest income -- your peak earning years.

25. Assuming you work for pay after you leave home, what is the total income per year you think you will make? Please give us <u>two</u> estimates -- first, the lowest this figure might realistically be; and second, the highest this figure might be.

Between $_________ and $_________
(lowest) (highest)
[2:36-45] [2:46-55]

26. What about your family income including money your wife or husband makes, if you get married, or income from any other sources; what is the total income per year you think you realistically will have? Again, please list two estimates -- a low and a high estimate.

Between $__________ (lowest) [2:56-65] and $__________ (highest) [2:66-75]

27. At the time when you are earning your highest income, would you most likely think of yourself as: (check one) [2:76]

- ☐ 1. Rich
- ☐ 2. Well-to-do
- ☐ 3. Middle income
- ☐ 4. Low-middle income
- ☐ 5. Low income
- ☐ 6. In poverty, or close to it

INSTRUCTIONS: This set of questions concerns your interest in different kinds of jobs. There are eight questions. You are to check ONE job in EACH question. Make sure it is the BEST ANSWER you can give to this question. Read each question carefully. They are all different. Do not omit any, EVEN IF YOU MUST GUESS.

28. Of the jobs listed in this question, which is the BEST ONE you are REALLY SURE YOU CAN GET when your SCHOOLING IS OVER? [3:08-09]

- ☐ 1. Lawyer
- ☐ 2. Welfare worker for a city government
- ☐ 3. United States Representative in Congress
- ☐ 4. Corporal in the Army
- ☐ 5. U.S. Supreme Court Justice
- ☐ 6. Night watchman
- ☐ 7. Sociologist
- ☐ 8. Policeman
- ☐ 9. County agricultural agent
- ☐ 10. Filling station attendant

29. Of the jobs listed in this question, which ONE would you choose if you were FREE TO CHOOSE ANY of them you wished when your SCHOOLING IS OVER? [3:10-11]

- ☐ 1. Member of the board of directors of a large corporation
- ☐ 2. Undertaker
- ☐ 3. Banker
- ☐ 4. Machine operator in a factory
- ☐ 5. Physician (doctor)
- ☐ 6. Clothes presser in a laundry
- ☐ 7. Accountant for a large business
- ☐ 8. Railroad conductor
- ☐ 9. Railroad engineer
- ☐ 10. Singer in a night club

30. Of the jobs listed in this question, which is the BEST ONE you are REALLY SURE YOU CAN GET when your SCHOOLING IS OVER? [3:12-13]

- ☐ 1. Nuclear physicist
- ☐ 2. Reporter for a daily newspaper
- ☐ 3. County judge
- ☐ 4. Barber
- ☐ 5. State Governor
- ☐ 6. Soda fountain clerk
- ☐ 7. Biologist
- ☐ 8. Mail carrier
- ☐ 9. Official of an international labor union
- ☐ 10. Farm hand

31. Of the jobs listed in this question, which ONE would you choose if you were FREE TO CHOOSE ANY of them you wished when your SCHOOLING IS OVER? [3:14-15]

- [ ] 1. Psychologist
- [ ] 2. Manager of a small store in a city
- [ ] 3. Head of a department in state government
- [ ] 4. Clerk in a store
- [ ] 5. Cabinet member in the federal government
- [ ] 6. Janitor
- [ ] 7. Musician in a symphony orchestra
- [ ] 8. Carpenter
- [ ] 9. Radio announcer
- [ ] 10. Coal miner

32. Of the jobs listed in this question, which is the BEST ONE you are REALLY SURE YOU CAN HAVE by the time you are 30 YEARS OLD? [3:16-17]

- [ ] 1. Civil engineer
- [ ] 2. Bookkeeper
- [ ] 3. Minister or priest
- [ ] 4. Streetcar motor man or city bus driver
- [ ] 5. Diplomat in the United States Foreign Service
- [ ] 6. Sharecropper (one who owns no livestock or farm machinery and does not manage the farm)
- [ ] 7. Author of novels
- [ ] 8. Plumber
- [ ] 9. Newspaper columnist
- [ ] 10. Taxi driver

33. Of the jobs listed in this question, which ONE would you choose to have when you are 30 YEARS OLD, if you were FREE TO HAVE ANY of them you wished?

[3:18-19]

- ☐ 1. Airline pilot
- ☐ 2. Insurance agent
- ☐ 3. Architect
- ☐ 4. Milk route man
- ☐ 5. Mayor of a large city
- ☐ 6. Garbage collector
- ☐ 7. Captain in the army
- ☐ 8. Garage mechanic
- ☐ 9. Owner-operator of a printing shop
- ☐ 10. Railroad section hand

34. Of the jobs listed in this question, which is the BEST ONE you are REALLY SURE YOU CAN HAVE by the time you are 30 YEARS OLD?

[3:20-21]

- ☐ 1. Artist who paints pictures that are exhibited in galleries
- ☐ 2. Traveling salesman for a wholesale concern
- ☐ 3. Chemist
- ☐ 4. Truck driver
- ☐ 5. College professor
- ☐ 6. Street sweeper
- ☐ 7. Building contractor
- ☐ 8. Local official of a labor union
- ☐ 9. Electrician
- ☐ 10. Restaurant waiter

35. Of the jobs listed in this question, which ONE would you choose to have when you are 30 YEARS OLD, if you were FREE TO HAVE ANY of them you wished?

[3:22-23]

☐ 1. Owner of a factory that employs about 100 people

☐ 2. Playground director

☐ 3. Dentist

☐ 4. Lumberjack

☐ 5. Scientist

☐ 6. Shoe shiner

☐ 7. Public school teacher

☐ 8. Owner-operator of a lunch stand

☐ 9. Trained machinist

☐ 10. Dock worker

36. This year at school, have you been participating on a <u>regular basis</u> in any of the activities listed below? Please check all those you participate in.

[3:24-43]

- [ ] None
- [ ] Band or orchestra
- [ ] Choir or chorus
- [ ] Drama (school plays, etc.)
- [ ] School paper or yearbook
- [ ] Language club (such as French, Spanish, German)
- [ ] Hobby or interest club (such as photography, chess, radio)
- [ ] Service activities (such as stage hand, band manager, athletic manager)
- [ ] Member of student government or class officer
- [ ] Academic honor club
- [ ] Intramural athletics

Interschool athletics:

- [ ] Basketball
- [ ] Football
- [ ] Baseball
- [ ] Track
- [ ] Soccer
- [ ] Swimming
- [ ] Wrestling
- [ ] Other interschool athletics
- [ ] Other activities, please list:

1. ______________________
2. ______________________
3. ______________________

SECTION III

QUESTIONS ABOUT OTHER PEOPLE'S ATTITUDES TOWARD YOUR CAREER

37. Do you think your parents want you to go to college? Please check one for your mother on the left and one for your father on the right.
[3:45] [3:46]

Mother	Father	
☐	☐	1. Yes, very much
☐	☐	2. Yes, somewhat
☐	☐	3. Neither yes nor no
☐	☐	4. No, prefer I not go
☐	☐	5. No, strongly opposed

38. Have your parents shared their desires with you by encouraging or discouraging you from going to college? Please check one for your mother on the left and one for your father on the right.
[3:47] [3:48]

Mother	Father	
☐	☐	1. Strongly discouraged
☐	☐	2. Discouraged somewhat
☐	☐	3. Neither discouraged nor encouraged
☐	☐	4. Encouraged somewhat
☐	☐	5. Strongly encouraged

39. Would you say that in your home it is just taken for granted that you will go to college? Please check one.
[3:49]

☐ 1. Yes

☐ 2. Not sure

☐ 3. No

40. During the past year, about how often would you say you have discussed going to college with your parents? Please check one on the left for your mother and one on the right for your father.
[3:50] [3:51]

Mother	Father		
☐	☐	(1)	Hardly at all, if ever
☐	☐	(2)	2 or 3 times
☐	☐	(3)	4 to 6 times
☐	☐	(4)	at least 7 times, but less than once a month
☐	☐	(5)	average once a month or more

41. What is the highest grade of regular school that you think each of your parents expects you to finish? Please check one on the left for your mother and one on the right for your father.
[3:52] [3:54]

Mother	Father		Level of Regular School
☐	☐	10.	High school sophomore
☐	☐	11.	High school junior
☐	☐	12.	High school <u>graduate</u>
☐	☐	13.	College freshman
☐	☐	14.	College sophomore
☐	☐	15.	C[illegible] junior
☐	☐	16.	College <u>graduate</u> (Bachelor's degree)
☐	☐	17.	Master's degree
☐	☐	18.	Ph.D. or professional degree such as medicine, law, or dentistry

42. If you had to guess, what would you say is the highest grade in regular school most of your high school friends might think you will finish? (Please check one.)

[3:56]

Level of Regular School

- ☐ 10. High school sophomore
- ☐ 11. High school junior
- ☐ 12. High school graduate
- ☐ 13. College freshman
- ☐ 14. College sophomore
- ☐ 15. College junior
- ☐ 16. College graduate (Bachelor's degree)
- ☐ 17. Master's degree
- ☐ 18. Ph.D. or professional degree such as medicine, law, or dentistry

43. Referring to jobs that you might have as your main occupation over most of your life, please list the name and duties of one occupation for each of the following cases. Don't leave any blank, even if you have to guess.

a. Occupation your mother expects is the most likely one you will end up in

_______________ name of occupation   _______________ duties or tasks of occupation

[3:58-60]

b. Occupation your father expects is the most likely one you will end up in

_______________ name of occupation   _______________ duties or tasks of occupation

[3:61-63]

c. Occupation you think your high school friends would be least surprised to find you in

_______________ name of occupation   _______________ duties or tasks of occupation

[3:64-66]

44. If you had to guess, what would you say is the highest yearly income each of your parents thinks you will ever make? Please write a yearly income in each blank.

_________ income your <u>mother</u> thinks you will make
[4:11-20]

_________ income your <u>father</u> thinks you will make
[4:21-30]

SECTION IV

WHAT YOU THINK OTHERS YOUR AGE ARE PLANNING

45. Referring to the people your own age who are your friends, which of the statements below best describes your guess about how many of them plan to go to college? (Check one only.)

[4:31]

- ☐ (1) 75% or more
- ☐ (2) 50% to 75%
- ☐ (3) 25% to 50%
- ☐ (4) less than 25%

46. What is the highest level of regular school that you think most of your high school friends will complete? Please check one. We realize you can't be sure about this; we just want whatever idea you have.

[4:32-33]

Level of Regular School

- ☐ 10. High school sophomore
- ☐ 11. High school junior
- ☐ 12. High school graduate
- ☐ 13. College freshman
- ☐ 14. College sophomore
- ☐ 15. College junior
- ☐ 16. College graduate (Bachelor's degree)
- ☐ 17. Master's degree
- ☐ 18. Ph.D. or professional degree such as medicine, law, or dentistry

47. Please list the names of one or more occupations that you would not be surprised to see most of your friends have as their main occupation over most of their lives. Also, please describe the main duties or tasks that people do in each of these occupations. Again, we realize that you can't be sure about this; we just want whatever ideas you have.

Name of Occupation	Duties or Tasks of this Occupation
1. ________________	________________
________________	________________ [4:34-36]
2. ________________	________________
________________	________________ [4:37-39]
3. ________________	________________
________________	________________ [4:40-42]

48. Do you think most of your high school friends will be (check one): [4:43]

- ☐ 1. Rich
- ☐ 2. Well-to-do
- ☐ 3. Middle income
- ☐ 4. Low-middle income
- ☐ 5. Low income
- ☐ 6. Poverty stricken or close to it.

49. In your major subjects (like English, math, or history) at school, how good a student would you say you are? (Check one.)

- ☐ 1. A+
- ☐ 2. A
- ☐ 3. A-
- ☐ 4. B+
- ☐ 5. B
- ☐ 6. B-
- ☐ 7. C+
- ☐ 8. C
- ☐ 9. C-
- ☐ 10. D+
- ☐ 11. D
- ☐ 12. D-
- ☐ 13. Below D-

Your time and effort in filling out this survey is invaluable to us. Thank you very much.

Protocol No. 78B 191

Forms 3, 5
Panel 1

THE NATIONAL CENTER
FOR RESEARCH IN VOCATIONAL EDUCATION
The Ohio State University · 1960 Kenny Road · Columbus, Ohio 43210
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ESTIMATING THE CHANCES

PARENT'S FORM

THE NATIONAL CENTER
FOR RESEARCH IN VOCATIONAL EDUCATION
The Ohio State University · 1960 Kenny Road · Columbus, Ohio 43210
Tel (614) 486-3655 Cable CTVOCEDOSU/Columbus, Ohio

WHY YOU ARE IMPORTANT!!

This survey is part of research we are doing on how young people think about jobs and careers. Your answers to our questions will give us a better understanding of how people get into different occupations. In turn, this understanding will allow us to help people choose careers that are best for them. As a result, you are a very important part of this study! We realize that the future is never certain and that you may not have thought about it very much, but everyone has some ideas. We ask you to share them with us.

There are three important things we would like you to keep in mind as you answer the questions:

1. Please be sure your answers are as accurate as you can make them. Your care and thought can help to improve the quality of vocational programs designed to help youth

2. Please read carefully all directions. Some of the questions are not very easy. Please ask if you have any doubt about what to do

3. Please be sure to answer all questions that apply to you. When you leave out even one question, it makes it hard or impossible for us to use your other answers. Every question has been carefully selected. We believe that your time is too valuable to be wasted on questions that are not important

Please note that when these questionnaires leave your house, no one will be allowed to see how you answered any question -- your answers are strictly confidential. DO NOT put your last name on any questionnaire.

We thank you for helping us.

SECTION I

OCCUPATION

We know that it is hard for parents to be sure about their children's future careers. In this questionnaire, therefore, we ask you to guess at the chances that your child will go into different occupations, get different levels of education, and make different amounts of income. Of course, you may not be sure about your child's chances either, but please give us your best guess for every question.

1. Please check one of the following: I am a ☐ male ☐ female [1:08]

2. The next few pages contain a list of jobs on the left side and a measuring line to the right of each job. The interviewer will explain how to fill out this section using the example below.

Example

Please estimate the chance of living most of your life in each of the following states.

Ohio	0 ________________________ 100
Colorado	0 ________________________ 100
Florida	0 ________________________ 100
Maine	0 ________________________ 100

In the following pages:

a. Don't worry if most of your checks are zero or close to zero. This is normal and expected.

b. If you have any questions, ALWAYS feel free to ASK the interviewer.

NAME OF JOB	CHANCE YOUR CHILD WILL BE IN THIS JOB (Place one check on each line)
Military officer [1:11]	0 ——— 100
Military enlisted person, not an officer [1:14]	0 ——— 100

NOTE: The remaining jobs are civilian jobs only.

Accountant [1:17]	0 ——— 100
Architect [1:20]	0 ——— 100
Computer specialist (such as programmer) [1:23]	0 ——— 100
Forester or conservationist [1:26]	0 ——— 100
Judge [1:29]	0 ——— 100
Librarian or curator	0 ——— 100
Physical scientist such as geologist or astronomer, but not an engineer, or a college professor [1:35]	0 ——— 100
Engineer such as chemical engineer or electrical engineer, but not a college professor	0 ——— 100
Social scientist, such as psychologist, economist, or sociologist, but not a college professor [1:41]	0 ——— 100

NAME OF JOB	CHANCE YOUR CHILD WILL BE IN THIS JOB (Place one check on each line)
Biological or agricultural scientist, but not a college professor [1:44]	0 — 100
Lawyer (but not a college professor) [1:47]	0 — 100
Physical, speech, or occupational therapist	0 — 100
Airplane pilot [1:53]	0 — 100
Air traffic controller or radio operator [1:56]	0 — 100
Flight engineer [1:59]	0 — 100
Designer, including designer of clothes, pottery, rugs, interior decorating, glassware	0 — 100
Bank officer or financial manager [1:65]	0 — 100
Funeral director or embalmer [1:68]	0 — 100
Inspector such as building safety inspector or bank examiner [1:71]	0 — 100

NAME OF JOB	CHANCE YOUR CHILD WILL BE IN THIS JOB (Place one check on each line)
Writer or author (fiction or nonfiction), journalist, reporter, editor, public relations person or publicity writer	0 — 100
Postmaster or mail superintendent, sales manager, or health administrator	0 — 100
Railroad conductor, officer or pilot of a ship, building manager or superintendent *[2:08]	0 — 100
Storekeeper or restaurant, cafeteria, or bar manager [2:11]	0 — 100
Corporation executive or college administrator such as college dean	0 — 100
Receptionist or office machine operator such as computer, keypunch or telephone operator	0 — 100
Stenographer, clerical work such as file, postal, or stock clerk [2:20]	0 — 100
Blacksmith or boilermaker [2:23]	0 — 100

NAME OF JOB	CHANCE YOUR CHILD WILL BE IN THIS JOB (Place one check on each line)
Operator of earth moving machinery and other heavy machinery such as bulldozer, grader, or crane [2:26]	0 ———— 100
Carpentry work such as cabinet maker or house-builder [2:29]	0 ———— 100
Bookbinder or typesetter in a print shop or related work [2:32]	0 ———— 100
Jeweler, watchmaker, machinist, optician, grinder, or polisher	0 ———— 100
Tailor or upholsterer	0 ———— 100
Tool and die maker [2:41]	0 ———— 100
Garage worker or gas station attendant [2:44]	0 ———— 100
Meatcutter, butcher, baker, or related work	0 ———— 100
Operator of a precision machine such as lathe, drillpress, milling machine, or grinder	0 ———— 100
Textile worker such as weaver [2:53]	0 ———— 100

NAME OF JOB	CHANCE YOUR CHILD WILL BE IN THIS JOB (Place one check on each line)
High school or grade school administrator such as principal or superintendent [2:56]	0 ——— 100
Other administrator or manager such as union officer, office manager [2:59]	0 ——— 100
Bank teller, cashier in a store, or bookkeeper	0 ——— 100
Vehicle dispatcher, such as taxicabs or police cars [2:65]	0 ——— 100
Insurance adjuster, examiner, or investigator	0 ——— 100
Mail carrier, deliveryman, routeman or reader of gas or electric meters [2:71]	0 ——— 100
Auctioneer [2:74]	0 ——— 100
Insurance agent or underwriter [2:77]	0 ——— 100
Real estate agent or appraiser *[3:08]	0 ——— 100
Stock and bond salesman	0 ——— 100

NAME OF JOB	CHANCE YOUR CHILD WILL BE IN THIS JOB (Place one check on each line)
Sales clerk in a store or other salesperson [3:14]	0 ——— 100
Medical secretary [3:17]	0 ——— 100
Secretary (except medical secretary) [3:20]	0 ——— 100
Railroad brakeman or railroad switchman [3:23]	0 ——— 100
Garbage collector [3:26]	0 ——— 100
Longshoreman, stevedore, sailor, or deckhand	0 ——— 100
Lumberman or related work such as working in a sawmill or miner, such as coal miner or other mine work [3:32]	0 ——— 100
Operator of a machine such as riviter, photo developer, welder [3:35]	0 ——— 100
Farmer or farm manager, farm foreman [3:38]	0 ——— 100
Farm laborer or self-employed farm service worker such as sheep shearer or combine operator [3:41]	0 ——— 100
Cleaning service worker in a business such as a hotel but not in a private home -- such as janitor, cleaning woman, maid [3:44]	0 ——— 100

NAME OF JOB	CHANCE YOUR CHILD WILL BE IN THIS JOB (Place one check on each line)
Food service worker such as bartender, busboy in a hotel, dishwasher, food counter or fountain worker or waiter or waitress	0 ——— 100
Protective service worker such as fireman, policeman, detective, sheriff, or bailiff [3:50]	0 ——— 100
Worker in a family home -- such as cook, child care worker, housekeeper, maid, or butler [3:53]	0 ——— 100
Personal service worker such as airline stewardess baggage porter or bellhop, barber, boarding and lodging housekeeper, elevator operator, hairdresser or cosmetologist, usher [3:56]	0 ——— 100
Medical doctor or dentist [3:59]	0 ——— 100
Registered nurse or dietition [3:62]	0 ——— 100
Optometrist (eye doctor)	0 ——— 100
Pharmacist or druggist	0 ——— 100
Veterinarian [3:71]	0 ——— 100

NAME OF JOB	CHANCE YOUR CHILD WILL BE IN THIS JOB (Place one check on each line)
Chiropractor; podiatrist (foot doctor) [3:74]	0 — 100
Minister, priest, or rabbi (or other clergyman)	0 — 100
Other religious worker	0 — 100
Social worker, recreation worker [4:11]	0 — 100
Elementary school teacher (including Kindergarten and preschool) [4:14]	0 — 100
High school teacher, vocational or educational counselor [4:17]	0 — 100
Other type of teacher	0 — 100
Engineer such as chemical or electrical engineer, science technician, surveyor or draftsman	0 — 100
Health service worker with no college training such as practical nurse, medical technician, or dental assistant [4:26]	0 — 100
Locomotive engineer or fireman [4:29]	0 — 100

NAME OF JOB	CHANCE YOUR CHILD WILL BE IN THIS JOB (Place one check on each line)
Auto mechanic or repairman of heavy equipment	0 ———————— 100
Household appliance, radio, television, or other mechanic or repairman [4:35]	0 ———————— 100
Motion picture projectionist [4:38]	0 ———————— 100
House painter or plasterer [4:41]	0 ———————— 100
Piano or organ tuner or repairman [4:44]	0 ———————— 100
Brick layer, electrician, plumber or related work	0 ———————— 100
Sheetmetal worker or tinsmith [4:50]	0 ———————— 100
Shoe repairman or shoemaking machine operator	0 ———————— 100
Sign painter or letterer	0 ———————— 100
College teacher or professor of sciences such as: physics, chemistry, astronomy, mathematics, geology, biology, agriculture, medicine, dentistry, pharmacy, or veterinary medicine	0 ———————— 100

NAME OF JOB	CHANCE YOUR CHILD WILL BE IN THIS JOB (Place one check on each line)
College teacher or professor of nonsciences such as: psychology, economics, sociology, political science, law, history, English, language, education, business, commerce, industrial arts, sport coach or physical education, art, drama, music [4:62]	0 — 100
Entertainer or artist such as actor, dancer, musician, composer, painter, sculptor, photographer, radio or TV announcer, professional athlete [4:65]	0 — 100
Other skilled or semiskilled craftsman, such as carpet installer, wallpaper hanger, foreman, telephone installer, repairman or lineman	0 — 100
Transport equipment operator such as parking attendant, bus driver, conductor or motorman as mass rail transport, taxicab driver, chauffer, or truck driver [4:71]	0 — 100

This list does not contain all possible occupations. If there are any other jobs you think your child might have as a main job ch were not in this list, please write them on the left side and rate hild's chances on the right.

NAME OF JOB	CHANCE YOUR CHILD WILL BE IN THIS JOB (Place one check on each line)
[4:74]	0 ——— 100
[4:77]	0 ——— 100
[5:08]	0 ——— 100
[5:11]	0 ——— 100
[5:14]	0 ——— 100
[5:17]	0 ——— 100
[5:20]	0 ——— 100
[5:23]	0 ——— 100

PLEASE CONTINUE ON TO THE NEXT PAGE

SECTION II

INCOME

3. Different income ranges are listed below next to measuring lines. Please rate the chance that each of the income ranges includes the highest total yearly income (not just take-home pay) your child will ever make. Assume the VALUE OF THE DOLLAR DOESN'T CHANGE.

Use the same method you did for jobs.

a. Put one check on each line

b. Place the check so that the farther to the right it is, the higher your child's chance is

c. Again, since only one income range can include the highest income your child will ever make, if you check very high on one, the rest necessarily must be low.

IF YOU HAVE ANY QUESTIONS, PLEASE ASK

$ PER YEAR	CHANCE THIS WILL BE THE HIGHEST INCOME YOUR CHILD WILL EVER MAKE (Place one check on each line)	
Under $4,000	0 ———————— 100	[5:26]
4,000 - 5,999	0 ———————— 100	[5:29]
6,000 - 7,999	0 ———————— 100	[5:32]
8,000 - 9,999	0 ———————— 100	[5:35]
10,000 - 11,999	0 ———————— 100	[5:38]
12,000 - 14,999	0 ———————— 100	[5:41]
15,000 - 19,999	0 ———————— 100	[5:44]
20,000 - 24,999	0 ———————— 100	[5:47]
25,000 - 29,999	0 ———————— 100	[5:50]
30,000 - 34,999	0 ———————— 100	[5:53]
35,000 - 39,999	0 ———————— 100	[5:56]
40,000 - or more	0 ———————— 100	[5:59]

SECTION III

EDUCATION

4. Different levels of regular schooling are listed below next to measuring lines. Please rate the chance that each one will be the highest level of regular school your child will ever attend or complete. (Regular school excludes specialized training such as those listed in the next question.)

Use the same method you used for jobs and income.

a. Place one check on each line

b. Place the check so that the farther to the right it is, the higher you think your child's chance is

c. Since only one grade can be the highest your child will ever attend, if you check very high on one, the rest must necessarily be low.

REGULAR SCHOOL LEVEL	CHANCE THIS WILL BE HIGHEST LEVEL ATTENDED (Place one check on each line)	
High school sophomore	0 ——— 100	[5:62]
High school junior	0 ——— 100	[5:65]
High school senior	0 ——— 100	[5:68]
College freshman	0 ——— 100	[5:71]
College sophomore	0 ——— 100	[5:74]
College junior	0 ——— 100	[5:77]
College senior	0 ——— 100	*[6:08]
Master's degree	0 ——— 100	[6:11]
Ph.D. or professional degree	0 ——— 100	[6:14]

5. Different types of special training are listed below next to measuring lines. Please rate the chance that your child will <u>complete each one</u>.

   a. Place <u>one</u> check on <u>each</u> line

   b. Place the check so that the farther to the right it is, the <u>higher</u> you think your child's chance is.

   c. Since it is possible that your child may complete more than one kind of special educational training, you can have more than one high check

<u>IF YOU HAVE ANY QUESTIONS, PLEASE ASK</u>

TYPE OF SPECIAL SCHOOLING	CHANCE OF COMPLETION (Place one check on each line)	
Nursing school (for RN's only)	0 ______________________ 100	[6:17]
Trade or craft such as mechanic, electrician, beautician, etc.	0 ______________________ 100	[6:20]
Business or office work	0 ______________________ 100	[6:23]
Science or engineering technology such as draftsman	0 ______________________ 100	[6:26]
Agricultural school	0 ______________________ 100	[6:29]
Home economics school	0 ______________________ 100	[6:32]
Real estate	0 ______________________ 100	[6:35]
Other, please specify ____________ ____________	0 ______________________ 100	[6:38]

Form 4,6
Panel 1

THE NATIONAL CENTER
FOR RESEARCH IN VOCATIONAL EDUCATION
The Ohio State University · 1960 Kenny Road · Columbus, Ohio 43210
Tel. (614) 486-3655 Cable CTVOCEDOSU/Columbus, Ohio

SURVEY OF MOTHERS
(or female guardians)

CAREER ASPIRATIONS

11

SECTION I

BACKGROUND INFORMATION

> Although the questions in this section are not directly related to your child's future, they are vitally important to us. Please answer every question even if you are not sure.

1. What is your sex? (Check below.) [1:08]

- [ ] 1. Female
- [ ] 2. Male

2. Is your race: (Check below.) [1:09]

- [ ] 1. Black
- [ ] 2. White
- [ ] 3. Other, please specify ______________________________

3. What is your birthday?

______	______	______
month	day	year
[1:10-11]	[1:12-13]	[1:14-15]

4. Are you now married, widowed, divorced, separated, or have you never been married?
[1:16]

- [ ] 1. Now married
- [ ] 2. Widowed (husband died and you have not remarried)
- [ ] 3. Divorced (and not remarried since)
- [ ] 4. Separated (legal)
- [ ] 5. Never married (include annulment here)

> NOTE: If your husband lives away from home for business reasons, consider yourself "now married" rather than "separated."

5. Please check the highest level of regular school you have finished and gotten credit for?

[1:17-18]

Level of Regular School
☐ 0. Less than 1st grade
☐ 1. 1st grade
☐ 2. 2nd grade
☐ 3. 3rd grade
☐ 4. 4th grade
☐ 5. 5th grade
☐ 6. 6th grade
☐ 7. 7th grade
☐ 8. 8th grade
☐ 9. High school freshman
☐ 10. High school sophomore
☐ 11. High school junior
☐ 12. High school graduate
☐ 13. College freshman
☐ 14. College sophomore
☐ 15. College junior
☐ 16. College graduate (Bachelor's degree)
☐ 17. Master's degree
☐ 18. Ph.D. or professional degree such as medicine, law, or dentistry

If you checked anything below college freshman skip to question 7.

6. What subject did you study for your <u>highest</u> level of school? Please check one.

[1:19-20]

- [ ] 1. Business and administration
- [ ] 2. Agriculture
- [ ] 3. Home economics
- [ ] 4. Art (painting, sculpture, theater)
- [ ] 5. Music
- [ ] 6. Biology
- [ ] 7. Black studies
- [ ] 8. English
- [ ] 9. Foreign language
- [ ] 10. History
- [ ] 11. Philosophy
- [ ] 12. Astronomy
- [ ] 13. Chemistry
- [ ] 14. Mathematics
- [ ] 15. Physics
- [ ] 16. Statistics
- [ ] 17. Anthropology
- [ ] 18. Economics
- [ ] 19. Political science
- [ ] 20. Psychology
- [ ] 21. Sociology
- [ ] 22. Journalism
- [ ] 23. Engineering
- [ ] 24. Architecture
- [ ] 25. Law
- [ ] 26. Medicine
- [ ] 27. Dentistry
- [ ] 28. Veterinary medicine
- [ ] 29. Seminary (preachers, priests, rabbis)
- [ ] 30. Pharmacy
- [ ] 31. Social work
- [ ] 32. Elementary education
- [ ] 33. Secondary education
- [ ] 34. Other, please specify ____________________

7. Besides regular schooling, what type of special schooling, if any, did you finish and get credit for? Please check as many as apply to you.

Type of Special Schooling

- [ ] 0. None [1:21]
- [ ] 1. Nursing school (for RN's only) [1:22]
- [ ] 2. Trade or craft such as mechanic, electrician, beautician, etc. [1:23]
- [ ] 3. Business or office work [1:24]
- [ ] 4. Science or engineering technology such as draftsman [1:25]
- [ ] 5. Agriculture school [1:26]
- [ ] 6. Home economics school [1:27]
- [ ] 7. Real estate [1:28]
- [ ] 8. Other, please specify ____________________ [1:29]

8. Are you now employed, a housewife, a student, or what? Please check as many as apply to you.

- [ ] 1. Working fulltime for pay (either in your home or outside your home) [1:30]
- [ ] 2. Working parttime for pay (either in your home or outside your home) [1:31]
- [ ] 3. In school (at least half time) [1:32]
- [ ] 4. Keeping house [1:33]
- [ ] 5. Retired [1:34]
- [ ] 6. Other, please specify ____________________ [1:35]

If you are working for pay, skip to question 11.

9. Are you looking for work right now? [1:36]

☐ 1. Yes

☐ 2. No

10. In which year did you last work for pay? If you never worked, check the box. [1:37-38]

_____ ⟶ (skip to question 11)
year

☐ I never worked for pay ⟶ (skip to question 19) [1:39]

11. What is your present main occupation or job called? [1:40-42]

____

____

Describe a little about what you do in this job. That is, what are some of your main duties or tasks?

____

____

12. What is the name of the place (business, industry, etc.) where you work? [1:43-45]

____

____

What kind of business or industry is this? That is, what do they do or make at the place where you work?

____

____

13. Do you work for yourself or someone else? (Consider that you work for yourself if you work for a corporation in which you own 15% or more of the stock.) (Please check one.)
[1:46]

- [ ] 1. Work for someone else
- [ ] 2. Work for myself in my own professional practice (such as law or medicine)
- [ ] 3. Work for myself in my own business (except professional practice)

If you work for someone else, skip to question 15.

14. If you work for yourself, are there any people who work for you and are paid by you?
[1:47]

- [ ] 1. No
- [ ] 2. Yes → If yes, how many? Please write the number of your employees in the blank. If you are not sure, write an estimate.
[1:48-52]

______

15. Do you supervise paid workers on a regular basis as part of your job?
[1:53]

- [ ] 1. No
- [ ] 2. Yes → If yes, how many? Please write the number you supervise in the blank. If you are not sure, write an estimate. [Note: Do not count people who are paid by you but who are supervised by someone else, such as a manager.]
[1:54-58]

______

16. Five years ago, in 1974, were you employed most of the year, a housewife, a student, or what? Check as many as apply to you.

☐ 1. Working fulltime for pay [1:59]

☐ 2. Working parttime for pay [1:60]

☐ 3. In school (at least half time) [1:61]

☐ 4. Keeping house [1:62]

☐ 5. Retired [1:63]

☐ 6. Other, please specify [1:64]

If you were not working in 1974 skip to question 19.

17. What was your main occupation in 1974 called? [1:65-67]

____

____

Describe a little about what you did on this job. That is, what were some of your main duties or tasks?

____

____

18. What was the name of the place (business, industry, etc.) where you previously worked? [1:68-70]

If your 1974 job was with the same employer as your present job, write "same" in the blank and skip to question 19.

____

____

What kind of business or industry was this? That is, what did they do or make at the place where you worked in 1974?

____

____

The next question asks about your family income last year. We only want a range, not an exact amount. Remember, your answers will never be shown to anyone -- they are strictly confidential.

19. To the best of your knowledge, which income range below includes your total family income in 1978? Please check one of the boxes. For convenience, each income level is listed as a yearly, monthly, and weekly amount. The figures on each row all give the same income for a year.

[1:71-72]

NOTE: Total family income includes all income made by any family member living in your home. It includes not only wages and salaries, but also income from any other place, such as rent, interest, business profits, child support, or welfare payments.

INCOME RANGES

$ Per Year	Is the same as:	$ Per Month	or	$ Per Week
☐ (1) Under $4,000		Under $333		Under $77
☐ (2) 4,000 to 5,999		333 to 499		77 to 114
☐ (3) 6,000 to 7,999		500 to 666		115 to 152
☐ (4) 8,000 to 9,999		667 to 832		153 to 191
☐ (5) 10,000 to 11,999		833 to 999		192 to 229
☐ (6) 12,000 to 14,999		1,000 to 1,249		230 to 286
☐ (7) 15,000 to 19,999		1,250 to 1,666		287 to 382
☐ (8) 20,000 to 24,999		1,667 to 2,082		383 to 479
☐ (9) 25,000 to 29,999		2,083 to 2,499		480 to 575
☐ (10) 30,000 to 34,999		2,500 to 2,916		576 to 670
☐ (11) 35,000 to 39,999		2,917 to 3,332		671 to 766
☐ (12) 40,00 or more		3,333 or more		767 or more

20. We are interested in knowing a little about your family and the people who live in your house.

Would you tell us the age of each person, including yourself, now living in your home, their sex, and relationship to ________.

Please include college students temporarily living away from home.

Age of each person living in your house	Sex of this person: Male	Female	Relationship to: ________	
yourself: ______	☐	☐	______	[2:11-15]
______	☐	☐	______	[2:16-20]
______	☐	☐	______	[2:21-25]
______	☐	☐	______	[2:26-30]
______	☐	☐	______	[2:31-35]
______	☐	☐	______	[2:36-40]
______	☐	☐	______	[2:41-45]
______	☐	☐	______	[2:46-50]
______	☐	☐	______	[2:51-55]
______	☐	☐	______	[2:56-60]
______	☐	☐	______	[2:61-65]
______	☐	☐	______	[2:66-70]
______	☐	☐	______	[2:71-75]
______	☐	☐	______	[2:76-80]

21. Would you also tell us the age, sex, and relationship of each of ____________ brothers and sisters who are not living in your home now -- that is, brothers and sisters not listed above. Also, please include any children who grew up with your child but who are not a brother or sister, and state their relationship to your child. [3:10]

If none, check here. ☐

Age	Sex: Male	Sex: Female	Relationship to: ________	
______	☐	☐	____________	[3:11-15]
______	☐	☐	____________	[3:16-20]
______	☐	☐	____________	[3:21-25]
______	☐	☐	____________	[3:26-30]
______	☐	☐	____________	[3:31-35]
______	☐	☐	____________	[3:36-40]
______	☐	☐	____________	[3:41-45]
______	☐	☐	____________	[3:46-50]
______	☐	☐	____________	[3:51-55]
______	☐	☐	____________	[3:56-60]
______	☐	☐	____________	[3:61-65]
______	☐	☐	____________	[3:66-70]
______	☐	☐	____________	[3:71-75]
______	☐	☐	____________	[3:76-80]

SECTION II

QUESTIONS ABOUT YOUR SON OR DAUGHTER'S FUTURE

The questions in this section are about your hopes and expectations for the future career of your sophomore son or daughter. Please answer every question to the best of your ability, even if you are not sure.

22. Do you want your child to go to college? Please check one. [4:08]

- [ ] 1. Yes, very much
- [ ] 2. Yes, somewhat
- [ ] 3. Haven't made up my mind
- [ ] 4. No, prefer he or she didn't go
- [ ] 5. No, strongly opposed

23. Have you mentioned your desires to your child by encouraging or discouraging them from going to college? (Please check one.) [4:09]

- [ ] 1. Strongly discouraged
- [ ] 2. Discouraged somewhat
- [ ] 3. Neither discouraged nor encouraged
- [ ] 4. Encouraged somewhat
- [ ] 5. Strongly encouraged

24. Would you say that in your home it is just taken for granted that your child will go to college? (Please check one.) [4:10]

- [ ] 1. Yes
- [ ] 2. Not sure
- [ ] 3. No

25. About how often during the past year would you say you have discussed going to college with your child? (Please check one.)

[4:11]

- ☐ (1) Hardly at all, if ever
- ☐ (2) 2 or 3 times
- ☐ (3) 4 to 6 times
- ☐ (4) At least 7 times, but less than once a month
- ☐ (5) Average once a month or more

26. What is the highest level of regular school you <u>want</u> your son or daughter to finish? (Please check one.)

[4:12-13]

<u>Level of Regular School</u>

- ☐ 10. High school sophomore
- ☐ 11. High school junior
- ☐ 12. High school <u>graduate</u>
- ☐ 13. College freshman
- ☐ 14. College sophomore
- ☐ 15. College junior
- ☐ 16. College <u>graduate</u> (Bachelor's degree)
- ☐ 17. Master's degree
- ☐ 18. Ph.D. or professional degree such as medicine, law, or dentistry

27. Disregarding what you would like, what is the highest level of school you realistically think your son or daughter will finish? (Please check one.)

[4:14-15]

Level of Regular School

- [ ] 10. High school sophomore
- [ ] 11. High school junior
- [ ] 12. High school graduate
- [ ] 13. College freshman
- [ ] 14. College sophomore
- [ ] 15. College junior
- [ ] 16. College graduate (Bachelor's degree)
- [ ] 17. Master's degree
- [ ] 18. Ph.D. or professional degree such as medicine, law, or dentistry

If you checked anything below college freshman, skip to question 29.

28. What subject do you think your son or daughter most likely will study for his or her highest level of schooling. (Please check one.) [4:16-17]

- [ ] 1. Business and Administration
- [ ] 2. Agriculture
- [ ] 3. Home economics
- [ ] 4. Art (painting, sculpture, theater)
- [ ] 5. Music
- [ ] 6. Biology
- [ ] 7. Black studies
- [ ] 8. English
- [ ] 9. Foreign language
- [ ] 10. History
- [ ] 11. Philosophy
- [ ] 12. Astronomy
- [ ] 13. Chemistry
- [ ] 14. Mathematics
- [ ] 15. Physics
- [ ] 16. Statistics
- [ ] 17. Anthropology
- [ ] 18. Economics
- [ ] 19. Political science
- [ ] 20. Psychology
- [ ] 21. Sociology
- [ ] 22. Journalism
- [ ] 23. Engineering
- [ ] 24. Architecture
- [ ] 25. Law
- [ ] 26. Medicine
- [ ] 27. Dentistry
- [ ] 28. Veterinary medicine
- [ ] 29. Seminary (preachers, priest rabbis)
- [ ] 30. Pharmacy
- [ ] 31. Social work
- [ ] 32. Elementary education
- [ ] 33. Secondary education
- [ ] 34. Other, please specify ______________

29. Besides regular schooling, what other types of schooling, if any, do you think your child <u>most</u> <u>likely</u> will finish? Check as many as apply.

<u>Type of Special Schooling</u>

- ☐ 0. None [4:18]
- ☐ 1. Nursing school (for RN's only) [4:19]
- ☐ 2. Trade or craft such as mechanic, electrician, beautician, etc.
- ☐ 3. Business or office work [4:21]
- ☐ 4. Science or engineering technology such as draftsman [4:22]
- ☐ 5. Agriculture school [4:23]
- ☐ 6. Home economics school [4:24]
- ☐ 7. Real estate [4:25]
- ☐ 8. Other, please specify ______________________ [4:26]

30. Please list the names of some occupations or types of job that you would <u>like</u> to see your son or daughter have as a main occupation throughout most of their life; <u>list at least one</u>, even if you are not sure. Also, please list a few of the most important duties or tasks that people do on each job. (If you want your child to stay home and keep house, list that, but please add at least one other occupation as well.)

List th‿ occupations in order of your preference, with the <u>one you want</u> most for your child listed <u>firs</u>˙. the one you want second, listed second, and so on.

Name of Occupation	D ₃ or Tasks of Occupation	
1. ______________________	______________________	[4:27-29]
2. ______________________	______________________	[4:30-32]
3. ______________________	______________________	[4:33-35]

31. The last question was about what you would like; this question concerns what you realistically expect. Please give the names and duties or tasks of any occupations that you expect your son or daughter might really be in as his or her main occupation over most of his or her life; list at least one, even if you aren't sure. (If you expect that your child will stay home and keep house, write that, but please add at least one other occupation as well.)

Again, please list the occupations roughly in the order of your expectation, with the one you consider most likely listed first; the second most likely listed second; and so on.

Name of Occupation	Duties or Tasks of Occupation
1. ________________	________________ [4:36-38]
2. ________________	________________ [4:39-41]
3. ________________	________________ [4:42-44]

The next several questions ask about what kind of life-style you think your child will follow.

32. Do you expect that your son or daughter will get married? Please check one.

[4:45]

- ☐ 1. Yes, quite sure my child will marry
- ☐ 2. Yes, my child probably will marry
- ☐ 3. Don't know
- ☐ 4. No, my child probably won't marry
- ☐ 5. No, quite sure my child won't marry

33. If your son or daughter gets married, what is the youngest age you think he/she will be?

[4:46-47]

__________ youngest age

34. What is the oldest age you think he/she will be.

[4:48-49]

__________ oldest age

35. What is the fewest number of children you expect your son or daughter to have?

[4:50-51]

__________ fewest number of children

36. What is the largest number of children you expect him/her to have?

[4:52-53]

__________ largest number of children

37. What relative amount of energy would you expect your child to devote to home life and to work? (Please check one.)

[4:54]

Relative energy devoted to home and to job

- [ ] 1. Much more energy devoted to home than to job
- [ ] 2. Somewhat more energy devoted to home than to job
- [ ] 3. About the same energy devoted to home as to job
- [ ] 4. Somewhat less energy devoted to home than to job
- [ ] 5. Much less energy devoted to home than to job

The next three questions concern your ideas about your child's future income. For all these questions, answer as if the VALUE OF THE DOLLAR STAYS THE SAME AS IT IS NOW. All three questions refer to the time in your child's life when he/she will make the most income -- the peak earning years.

38. Assuming your child works for pay after leaving home, what is the total income per year you think he/she will make? Please give us two estimates -- first, the lowest this figure might realistically be; and second, the highest this figure might be.

    Between $________ and $________
    (lowest) (highest)

    [4:55-64] [4:65-74]

39. What about your child's family income, including money their wife or husband makes, if they get married, or income from any other source; what is the highest income per year you think they realistically will have? Again, please list two estimates -- a low and a high estimate.

    Between $________ and $________
    (lowest) (highest)

    [5:11-20] [5:21-30]

40. At the time when your child is earning his/her highest income, would you think he/she most likely will be: (Check one) [5:31]

    ☐ 1. Rich
    ☐ 2. Well-to-do
    ☐ 3. Middle income
    ☐ 4. Low-middle income
    ☐ 5. Low income
    ☐ 6. In poverty, or close to it

INSTRUCTIONS: This set of questions concerns your interest in different kinds of jobs for your son or daughter.

There are eight questions. You are to check ONE job in EACH question. Make sure it is the BEST ANSWER you can give to this question.

Read each question carefully. They are all different. Do not omit any, EVEN IF YOU MUST GUESS.

41. Of the jobs listed in this question, which is the BEST ONE you are REALLY SURE HE/SHE CAN GET when his/her SCHOOLING IS OVER.

[5:32-33]

- ☐ 1. Lawyer
- ☐ 2. Welfare worker for a city government
- ☐ 3. United States Representative in Congress
- ☐ 4. Corporal in the Army
- ☐ 5. United States Supreme Court Justice
- ☐ 6. Night watchman
- ☐ 7. Sociologist
- ☐ 8. Policeman
- ☐ 9. County agricultural agent
- ☐ 10. Filling station attendant

42. Of the jobs listed in this question, which ONE would you most like to see him/her have if he/she were FREE TO CHOOSE ANY of them he/she wished when his/her SCHOOLING IS OVER?

[5:34-35]

☐ 1. Member of the board of directors of a large corporation

☐ 2. Undertaker

☐ 3. Banker

☐ 4. Machine operator in a factory

☐ 5. Physician (doctor)

☐ 6. Clothes presser in a laundry

☐ 7. Accountant for a large business

☐ 8. Railroad conductor

☐ 9. Railroad engineer

☐ 10. Singer in a night club

43. Of the jobs listed in this question which is the BEST ONE you are REALLY SURE HE/SHE CAN GET when his/her SCHOOLING IS OVER?

[5:36-37]

☐ 1. Nuclear physicist

☐ 2. Reporter for a daily newspaper

☐ 3. County judge

☐ 4. Barber

☐ 5. State governor

☐ 6. Soda fountain clerk

☐ 7. Biologist

☐ 8. Mail carrier

☐ 9. Official of an international labor union

☐ 10. Farm hand

44. Of the jobs listed in this question, which ONE would you most like to see him/her have if he/she were FREE TO CHOOSE ANY of them he/she wished when his/her SCHOOLING IS OVER?

[5:38-39]

- [ ] 1. Psychologist
- [ ] 2. Manager of a small store in a city
- [ ] 3. Head of a department in state government
- [ ] 4. Clerk in a store
- [ ] 5. Cabinet member in the federal government
- [ ] 6. Janitor
- [ ] 7. Musician in a symphony orchestra
- [ ] 8. Carpenter
- [ ] 9. Radio announcer
- [ ] 10. Coal miner

45. Of the jobs listed in this question, which is the BEST ONE you are REALLY SURE HE/SHE CAN GET by the time he/she is 30 YEARS OLD?

[5:40-41]

- [ ] 1. Civil engineer
- [ ] 2. Bookkeeper
- [ ] 3. Minister or priest
- [ ] 4. Streetcar motorman or city bus driver
- [ ] 5. Diplomat in the United States Foreign Service
- [ ] 6. Sharecropper (one who owns no livestock or farm machinery, and does not manage the farm)
- [ ] 7. Author of novels
- [ ] 8. Plumber
- [ ] 9. Newspaper columnist
- [ ] 10. Taxi driver

46. Of the jobs listed in this question, which ONE would you like to see him/her have when he/she is 30 YEARS OLD, if he/she were FREE TO CHOOSE ANY of them he/she wished?

[5:42-43]

- [ ] 1. Airline pilot
- [ ] 2. Insurance agent
- [ ] 3. Architect
- [ ] 4. Milk route man
- [ ] 5. Mayor of a large city
- [ ] 6. Garbage collector
- [ ] 7. Captain in the Army
- [ ] 8. Garage mechanic
- [ ] 9. Owner-operator of a printing shop
- [ ] 10. Railroad section hand

47. Of the jobs listed in this question, which is the BEST ONE you are REALLY SURE HE/SHE CAN HAVE by the time he/she is 30 YEARS OLD?

[5:44-45]

- [ ] 1. Artist who paints pictures that are exhibited in galleries
- [ ] 2. Traveling salesman for a wholesale concern
- [ ] 3. Chemist
- [ ] 4. Truck driver
- [ ] 5. College professor
- [ ] 6. Street sweeper
- [ ] 7. Building contractor
- [ ] 8. Local official of a labor union
- [ ] 9. Electrician
- [ ] 10. Restaurant waiter

48. Of the jobs listed in this question, which ONE would you like to see him/her have when he/she is 30 YEARS OLD, if he/she were FREE TO HAVE ANY of them he wished?

[5:46-47]

- [ ] 1. Owner of a factory that employs about 100 people
- [ ] 2. Playground director
- [ ] 3. Dentist
- [ ] 4. Lumberjack
- [ ] 5. Scientist
- [ ] 6. Shoeshiner
- [ ] 7. Public school teacher
- [ ] 8. Owner-operator of a lunch stand
- [ ] 9. Trained machinist
- [ ] 10. Dock worker

Your time and care in answering these questions have been invaluable to us. Thank you very much.

APPENDIX B

INSTRUMENTATION, DATA COLLECTION, AND CODING

Introduction

This appendix provides further explication of (1) instrumentation; (2) data collection procedures; and (3) data coding and correction procedures used during panel one of the study. In addition to aiding in the understanding and evaluation of this project, the following details are intended to be a resource to other researchers involved in the collection and coding of occupational data.

Instrumentation

The instruments consist of a total of six questionnaire booklets (forms). One pair of booklets was designed for use by students, one pair by mothers and one pair by fathers. The first booklet of each pair (forms 1, 3 & 5) contained subjective probability questions eliciting occupational, educational and income expectation data. The second of each pair (forms 2, 4, & 6) contained questions concerning a range of topics including background (e.g., sex, age, number of siblings), additional expectation and aspiration data, and perceived and objective significant others information.

The complete set of instruments used in panel one of the study is reproduced in Appendix A. This section provides a classification and discussion of items contained in the instruments. The discussion includes (1) a description of the format of the items and instructions to respondents, (2) respondent reactions to the items, (3) coding procedures, and (4) coder reactions to the items. Following the discussion of question types, a summary of procedures used in the development of the instruments is presented.

Types of Questionnaire Items

Classification of questions in the following discussion is by format. Closed-ended questions are discussed first followed by discussion of open-ended questions.

Closed-ended questions. The following closed-ended questions were contained in the instrument: the Occupational Aspiration Scale (OAS); subjective-probability questions; and nonoccupational, closed-ended questions. Each is discussed below.

In the OAS, eight lists containing ten job titles each were presented to both youth and parents. The youth was asked to select from each list that job which he/she really wanted to have (". . . if you were free to choose any of them you wished.") or that job he/she felt certain of being able to obtain (". . . best that you are really sure you can get"). Similarly, parents were asked to select the jobs they felt their son or daughter would really like to have and the jobs they felt he/she could really get. Although a revised version of the OAS, designed for use with

female youth has been developed and tested (Hotchkiss, et al., 1978), the original OAS is the only form used in this study. Reasons for the decision to omit the female version of the OAS are covered in the section regarding Instrument Development.

Respondent reaction to the OAS was marked by numerous objections to the content of the job lists. The most common comment was that many of the jobs listed were inappropriate for females. There was definite evidence that this sentiment affected the response rate. In several instances, written comments of the above nature accompanied nonresponse to all or some OAS items.

In coding the OAS, coders recorded the number assigned to the item response on the code sheet. No difficulties in coding were noted.

Subjective-probability questions contained in the instruments elicited occupational, educational and income expectation information concerning the youth. For these items, a list of outcomes (school grade levels, types of jobs, or salary ranges) appeared on the left side of each page. To the right of each of these items there appeared a horizontal line marked 0 percent and 100 percent at the left and right ends of the line, respectively. Respondents were instructed to place a checkmark on each line at the point on the line that indicated what respondents felt their chances were of accomplishing the particular outcome indicated on the left.

Respondent behavior regarding the subjective-probability questions merits special attention since this is the first time that this type of question has been used. Although it is not possible to report figures based on a systematic check, there was evidence suggesting that some respondents may not have understood instructions to section II (income expectations) and section III (regular education expectations) in the subjective probability booklets (See Appendix A, form 1, pages 13 and 14 for examples).

Section II in the subjective-probability booklets asked the respondent to rate, for each of the income ranges listed, the chance that each range included the "highest total yearly income" that he/she would ever make. Section III required the respondent to rate, for each of the school levels listed, the chance that each level of schooling would be the highest level that he/she would complete (that he/she would stop after completing that level). A few cases were noted in which a respondent's checkmarks began at or near 100 percent for the lowest level of education or income ("high school sophomore" or "under $4,000.00"), and descended in value as the education or income level ascended. Although not conclusive evidence of misunderstanding, such a pattern suggests that some respondents interpreted the question to mean: "What is the chance that you will achieve at least the amount of education or income listed on the left?" A computer adjustment for this pattern, however, produced negligible changes in correlations.

Interviewers reported other evidence, too varied to list, of respondent difficulty with instructions to these questions. There was no indication, however, that the response rate for the subjective-probability questions was

affected by these problems. Further, the high correlations achieved with the subjective probability items (see Chapter 3) indicate that such difficulties were not excessive.

The length of the subjective probability occupation checklist (93 occupational groups, 11 pages) was the source of some concern during the planning stage (see discussion in section on Instrument Development). No negative reactions from respondents, however, were noted. Response time ranged from approximately 10 minutes to approximately 20 minutes (for all subjective-probability questions in each set).

In coding subjective probability responses, coders used a 100-point scaled ruler to measure the distance between the checkmark and the 0 point on the line. This two-digit number was recorded on a special coding sheet in preparation for keypunching. Accuracy of measurement within 2 points was required.

Coding of the subjecitve probabilities was tedious and time consuming; however, no serious problems were observed. Coding time exceeded response time, averaging approximately 30 minutes.

The remaining closed-ended questions contained in the instruments elicited nonoccupational information. Most consisted of a question stem followed by a sequence of numbered response alternatives. Respondents were instructed to place checkmarks next to the one or more alternatives reflecting their opinion or situation. There was no evidence to suggest respondent difficulty with these questions.

Coding procedures for nonoccupational, closed-ended questions differed depending upon whether one, or more than one, response by respondents was permitted. If only one response were allowed, coders usually recorded the numerical precode used in numbering the response alternative. For example, to code a checkmark placed next to the fourth alternative of a sequence of response alternatives, the coder recorded a "4" on the code sheet. These questions were referred to as precoded questions. Most of the closed-ended questions in the instruments were precoded.

For those questions in which numerous responses were permitted, coders recorded a 1 or 0 on the code sheet for each response alternative, depending upon whether it had been checked or not by respondents. These questions were referred to as binary code questions. The following items in the instruments were binary code questions: form (booklet) 2, items 5, 16 and 36; forms (booklets) 4 and 6, items 7, 8, 16, and 29.

Although coding for precoded and binary code closed-ended questions was not difficult, similarities in the appearance of the two created some confusion, resulting in the miscoding of some binary code questions according to rules designated for the coding of precoded questions.

Open-ended questions. Open-ended questions contained in the instrument were both occupational and nonoccupational.

The following open-ended questions in the instruments elicited occupational information: form 2, items 7, 9, 17, 18, 43, and 47; forms 4 &

6, items 11, 12, 17, 18, 30, and 31. These questions elicited occupational information concerning the youth and his/her friends (job expectations and aspirations) and occupational and industry information concerning the parents (current and past jobs). Each question consisted of two parts, the first eliciting a job title or name of the business, and a second eliciting a job or industry description.

There was no evidence to suggest respondent difficulty with the open-ended occupational questions although responses provided were often imprecise or incomplete, creating problems for coders.

In addition to occupational questions the surveys contained numerous open-ended questions designed to obtain nonoccupational information such as ages, dates and income expectations. In responding to these questions, individuals were asked to write a response, usually a number, on a blank.

Although most of the nonoccupational, open-ended questions created no problems for respondents or coders, two of these questions did pose some difficulty for respondents, resulting in significant response error. Questions 20 and 21 in forms 4 and 6, the enumeration questions (see Appendix A, forms 4/6, pages 9 and 10 for reproductions of these items), required each parent to list the name, age, sex, and relationship to the high school youth of all individuals in the family or household. These questions were designed to obtain numerous types of information including family size, household membership, sibling order, number and ages of brothers, and number and ages of sisters. Although intended to conserve questionnaire space and to minimize respondent fatigue, respondent reaction to these questions indicated that the questions lacked clarity. The most common error noted was the recording of incorrect relationship information: parents often stated a household member's relationship to themselves instead of the requested relationship to the student.

Questions 25, 26 and 44 in form 2 and 38 and 39 in forms 4 and 6 (see Appendix A, form 2, pages 12, 13 and 23; and forms 4/6, page 18 for reproductions of these items) required respondents to specify (in numerical form) their lowest and highest income expectations. Responses to these questions included contradictory entries (e.g., the larger amount reported in the blank provided for the lower end of the range); unusually low dollar estimates for yearly income (e.g., $50.00); and entries involving misplacemnt of commas or decimal points (e.g., $2059.900; $20599,00).

Both the enumeration questions and the open-ended income expectation and aspiration questions were revised significantly in the panel-two instruments.

Coding for most of the nonoccupational open-ended questions consisted of straight-forward transfer of the numerical entries reported on the blanks to the coding sheet. Relationship data in the enumeration questions, however, had to be transformed into numeric codes. Coding of nonoccupational open-ended items was not difficult.

Instrument Development

Whenever possible, questionnaire items used in the surveys were borrowed from or patterned from items used in previous studies. Reasons for this were threefold: (1) to save time, (2) to assure high reliability by using items already proven empirically, and (3) to maintain comparability with previous research. Whenever extant items could not be used, project staff designed original items. Procedures used in each of these processes are discussed below. (The pilot test used to pretest all questionnaire items is described in a later section on Data Collection Procedures.)

Borrowed Items. A literature search of more than 62 publications was carried out for the purpose of collecting the exact wordings of questions and response alternatives used to measure career planning variables in previous research. Through this procedure, approximately 250 questionnaire items (from 36 data sets) for 60 variables were found. Project staff compiled a 69-page reference book of items and reviewed all items to select the most desirable constructions for inclusion in the current study. The following criteria were used in selecting items: readability, clarity of wording, frequency of use in other studies, response time, and the magnitude of correlation with other variables with which theory indicated an association.

One point regarding one of the borrowed items, the Occupational Aspiration Scale (OAS), should be mentioned. The initial plan had been to include both the original (male) and the more recently developed female form of the OAS; both were included in the pilot test. This would have required four different versions of the questionnaire booklets (female youth; male youth; parents of female youth; parents of male youth) instead of two booklets (youth and parent). Interviewer reaction during the pilot test and limited time available for preparation of materials prior to panel one forced staff to abandon the plan to use both forms of the OAS. The alternative of including both versions in each booklet was also abandoned becaus the increase in questionnaire length that would result.

Original items. Procedures used in designing original items included the usual deliberation involved in question design. Most significant among these items were the subjective probability questions. The following discussion focuses on issues involved in the planning of the subjective-probability questions considered most crucial to assuring their quality as effective alternatives to conventionally formated questions. The main issues relate to the following three elements: (1) the number line, (2) the checklist of occupations (occupation subjective-probability question); and (3) design of instructions for answering the subjective-probability questions. Each of these issues is discussed in the following paragraphs. Following these discussions, descriptions of the three pretests conducted to test the subjective-probability items is presented.

(1) Number line - In the final instrument, only two of the percentage points on each number line were labeled (the 0 percent and 100 percent values). In designing the number lines, project staff considered marking each line at several percentage points (such as 0 percent, 10 percent, 20 percent, . . .), on the one hand, or, on the other hand, not marking any of

the percentage points. Although it was conceded that the former system would create greater ease in response and coding, project staff feared the possibility that numerous percentage-point labels might influence respondents to cluster their responses at the labeled points. The effect would be to destroy the continuous feature of the number line, reducing the subjective-probability questions to discrete-category items.

The idea of omitting number lines completely and providing blanks for respondents to write percentage figures for their subjective probabilities was also considered. This idea was tested during pretest sessions with high school students. Because of the greater speed possible in making checkmarks, students preferred the number line.

(2) Occupation checklist - Creating a checklist for the subjective-probability occupation question constituted a major problem during the planning operation. Logic underlying probability theory dictates the need for an exhaustive list; practicalities and concern about respondent fatigue suggest the need for as short a list as possible. The 1970 census list of occupations offers important advantages. First, it purports to be comprehensive, and the titles are mutually exclusive. Secondly, much descriptive information, including Duncan SEI scores is available for the census titles. The list contains over 400 titles, however; project staff had reservations about using such a long list. On the other hand, staff were skeptical of the validity of schemes to shorten the list. Partly as a result of this dilemma staff experimented with the alternative of omitting the checklist and allowing respondents to write in titles for those jobs that they had considered. During pretests conducted with high school students, both systems were tried; students expressed preference for the checklist. Since the checklist required less coding time and students preferred it, project staff undertook the difficult task of collapsing census titles into a list of usable length. The technique used was to group together in single categories those titles similar in type and in Duncan SEI scores. The result was the reduction of the 400-item census list to a list containing 93 occupational groups. In addition, space was provided at the end of the list for respondents to write in titles of any additional jobs they felt had not been included in the checklist.

(3) Instructions for subjective-probability questions - Another problem was the question of how to explain to respondents the method of answering these questions. Alternatives considered by staff included verbal instructions provided by interviewers, written instructions printed in the text, and combinations of both; and ranged from simple plans (involving, e.g., practice examples) to more elaborate plans (involving test-like situations or hands-on instructional aids). Project staff experimented with some of these ideas during the pre and pilot tests. The major concerns throughout were the fear of intimidating respondents and concern regarding clarity and uniformity of instructions across all respondents.

Concern for uniformity caused staff to prefer written instructions but pretest and pilot test experiences suggesting that respondents do not always read instructions forced staff to consider verbal directions from interviewers. The important concern regarding the possibility of

intimidating respondents, however, cautioned staff against allowing the verbal component to assume connotations of a test of respondents' intelligence.

The final decision was to rely on what was believed to be the intuitive notion that most individuals have about "chances" and to limit the length and complexity of instructions. The result was a combination of verbal and written instructions. These instructions are described in the summary of Data Collection Procedures.

Subjective-probability pretests. Project staff conducted three pretests on the subjective-probability instrument in local public high schools. Both inner-city and middle class high schools were used in the pretests. All three pretests focused primarily on three issues: (1) format and design of the subjective-probability questions, (2) instructions, and (3) response time.

Various format alternatives were tested. The most important of these include (1) the occupation checklist versus fill-ins, (for listing future job preferences), and (2) the number line versus fill-ins (for recording percentages). (See discussions of checklist and number line in Instrument Development section.) Students were divided into two groups; each group using one format. Reactions were then compared. The result was the preference for the number line and the checklist as opposed to their fill-in alternatives.

In pretesting instructions, project staff sought answers to three questions: What form should instructions take (written or oral or both; with examples or without)? How extensive should instructions be? And what wording should be used? During the pretests, project staff experimented with a combination of oral and written instructions. One general observation across all three student groups was the tendency against reading instructions, especially if lengthy. This experience contributed to the decision to simplify and shorten instructions for the final instrument.

Each version of the subjective-probability questionnaire was timed during the pretests to assure that response time would be twenty minutes or less.

Data Collection Procedures

In this section, details about the fieldwork are presented. The first subsection deals with planning for data collection, including the pilot test of all the instruments and training of interviewers. The second subsection describes field activities. The final subsection describes monitoring of the data collection.

Planning for Data Collection

The skeleton plan for gathering data called for obtaining data from high school students and their parents within the city of Columbus, at three time points within a three year period. Data were to be collected via interviewer visits to respondents' homes.

In the first stage of planning, project staff attempted to identify specific strategies that could be used to impliment the plan. Toward this end, project staff discussed their own ideas and sought suggestions from individuals with experience or knowledge of data-collection techniques in general and panel studies in particular. In addition, staff reviewed the literature to obtain ideas. Included in this review were descriptions of the data-collection systems of other studies (especially those related to the same topic), and general discussions of field methods. Examples of types of discussions consulted include the description of methodology contained in Youth in Transition (Bachman, 1970); and general discussions on methodology contained in various issues of the Public Opinion Quarterly (e.g., Crider, et al., 1971; Dohrenwend, et al., 1968; Schuman, et al., 1971; Taylor, 1976).

In the second stage of planning, project staff discussed ideas obtained from the above sources in a formal session with consultants. In the third stage of planning, a tentative plan was defined by project staff in consultation with the staff of a local research survey firm (Appropriate Solutions, Inc.). The tentative plan was then pilot tested and revised. A manual explaining the plan to interviewers, Interviewer Special Instructions, was composed.

Special Problems. The final plan for the data-collection operation is presented in the next section. The following paragraphs discuss decisions made concerning some of the more important problems involved in collecting data. The discussion is organized around two objectives, central to all data collection planning operations: (1) maximizing respondent participation levels, and (2) preventing bias.

(1) Participation level and attrition rates - In the present study, ideas to maximize participation included several strategies: (1) a support letter was sent to respondents from the superintendent of public schools, (2) monetary incentives were offered to participants ($10.00 per panel per family), and (3) questionnaires were hand delivered to respondents' homes instead of mailed.

Because the study was designed as a three-year panel study, the problem of maintaining respondents across panels was a serious concern. Two types of attrition, differing in their source and origin can be distinguished: (1) attrition due to a respondent's deliberate decision to withdraw, and (2) attrition caused indirectly by events such as a respondent moving outside the area of study, or to an unknown address within the study area.

Numerous techniques to prevent withdrawal from the study were noted in the literature and were used in this survey. First, attempts were made both in the letter announcing the study, and throughout the study, to instill in respondents a sense of the importance of the study, as well as their importance to the success of the study. Secondly, monetary incentives were continued for each panel. An idea used in previous studies and adopted in this study was the use of an interim newsletter mailed to respondents (Bachman, 1970). Because of fear of influencing responses to the questionnaires, however, the progress report for the present study refrained from discussing theory or reporting findings.

External sources of attrition such as a family's relocation are not under the control of a research study. Project staff did, however, attempt to control cases of attrition resulting from this situation. Change-of-address and telephone number postcards were continuously distributed to respondents (in person and through the mail) throughout the year. A plan for sending address-correction-requested letters to respondents (a service available through the Postal System) at the beginning of each panel was adopted.

One research discussion (Wilcox, 1965) consulted in the literature review reported statistical evidence of the propensity toward survey attrition on the part of certain groups of people including renters and low income individuals. This information stimulated questions to respondents asking whether respondents owned or rented their homes. This was done on a supplementary form to the questionnaire called the Follow-Up form. This form was also used to ask respondents if they planned to move during the year, and if so, whether they would or would not remain within the Columbus area. In addition, the form elicited the name of a person (close friend or relative) to serve as a contact in case the respondent family moved without notifying the research project. No special effort was required to obtain information about the income status of the family since questions regarding income were already contained in the instruments.

(2) Prevention of bias - The problem of bias was a major issue during the planning. The form of bias considered the greatest threat to valid information in the study was intra-family contamination of data: i.e., the effects of individual family members on the responses of other family members. This included concern that family members might confer with one another in filling out their questionnaire booklets and concern that the mere presence of other family members in the same room might unconsciously affect a respondent in influencing him/her to offer answers acceptable to the other individuals in the room (the group-interview affect). The former concern was one of the reasons for the plan to use interviewers to deliver, collect, and return questionnaires, instead of a mail-out or drop-off system. It was also the reason for simultaneous completion of questionnaires by all family members instead of a possible in-school interview for students with take-home questionnaires for parents. Project staff found it impossible to address the latter concern.

Pilot test. All data collection procedures were pilot tested prior to the fieldoperation. Twenty-four respondent families and six interviewers participated in the test. Interviewer contact with prospective respondents for the pilot test differed from those used in the actual study. In the fieldwork for panel one, letters from the project director and from the superintendent of the Columbus public schools were sent to respondents prior to telephone contact by interviewers; these letters were not part of the pilot test.

Following the pilot test, a debriefing session during which interviewers reported their experiences was held. In addition, each interviewer submitted a form for each family interviewed reporting on various aspects of the home visit such as: (1) ability of family members to read the instrument with understanding, (2) specific questionnaire items that created problems for respondents, and (3) duration of home visit.

Training of interviewers. As explained in the text, all interviewers attended a four-hour briefing session relating specific information and instructions regarding the study. In addition all interviewers had previously completed comprehensive training concerning all types of interviewing.

Three important topics covered in the briefing session were: (1) underlying logic of the subjective-probability questions, (2) procedures for explaining the subjective-probability questions to respondents, and (3) how to obtain codable responses to the open-ended occupation and industry questions. The Special Instructions To Interviewers manual was used as the basis for discussions regarding the first two topics. Discussion about obtaining codable responses consisted of (1) a brief explanation of the steps and resources used in census coding, (2) presentation of coding examples to demonstrate the importance of specific and complete information, and (3) practice in coding occupational and industry entries.

Field Activities

This discussion is subdivided into four subsections. The first subsection discusses selection of respondents. Subsection two pertains to selection of interviewers. Subsection three describes the initial contact with prospective respondents. The final subsection describes the visit of interviewers in respondents' homes.

Respondents. As reported in the text section on sampling, students for the survey were selected from the master list of high school sophomores attending the Columbus public school system. The ratio of oversampling required, as reported in the text discussion of sampling (Chapter Two), was three to one. Subsequent to pulling the sample, parents of each student were contacted in order to obtain agreement to participate.

In addition to the requirement that the student be enrolled as a regular (nonspecial-education-program) sophomore in a Columbus public high school, there were two other criteria for family participation: (1) willingness of at least one parent (or parent substitute) to participate, and (2) ability of all participating family members to read and fill in their own questionnaire booklets (functional literacy).

Interviewers. Twenty-eight individuals were hired to hand carry questionnaires to respondents' homes during the field operation. Many of these individuals previously were on the interviewing staff of a local survey research firm (Appropriate Solutions, Inc. [ASI]). The term "interviewer" is used throughout this report in referring to this group of workers, despite the fact that their responsibilities did not require actual administration of questionnaires. The numerous tasks related to the interview session assigned to the interviewers are outlined below. Training of interviewers has been described in the section on Planning for Data Collection.

Initial contacts with respondents. After letters from the project director and the superintendent of Columbus Public Schools were mailed to

respondents, interviewers made telephone calls to potential respondents in order to: (1) confirm all conditions of eligibility (it was at this point that attempts were made to eliminate special-education-program students and functional illiterates), (2) obtain agreement for participation, and (3) schedule the home visit. Under no circumstance was a home visit made without prior telephone contact.

Home visit. During the home visits, each participating family member filled in a pair of questionnaire booklets. Instructions for answering all booklets were provided in written form. Instructions for booklets 2, 4, and 6 (the second booklets filled in by the youth, mother and father, respectively) were designed to be read independently. Instructions for booklets 1, 3, and 5 (the first questionnaire booklets filled in by youth, mother and father, respectively) containing the subjective-probability questions, were designed to be read to the respondent by the interviewer (see Planning for Data Collection section for discussion). Exact steps of the instruction process were as follows: (1) the interviewer read instructions to respondents, (2) respondents completed one practice example given in the questionnaire booklet, (3) the interviewer examined respondents' responses, and (4) the interviewer interpreted to respondents the meaning of the responses, and asked if the interpretation were correct. If a respondent reported that the interviewer's interpretation did not reflect the respondent's intention, the respondent was asked to explain to the interviewer what he/she meant by the response. The interviewer then explained to the respondent how the question should have been checked.

After completion, questionnaires were edited by the interviewer to assure that all questions had been answered. In addition, interviewers obtained respondent signatures on various forms.

Completed questionnaire booklets from each home visit were returned to the project office during weekly check-in sessions scheduled for each interviewer. Details concerning this and other aspects of the management of the field operation are explained in the next section concerning Monitoring and Managing the Field Operation.

Monitoring and Managing the Field Operation

Discussion of the following topics is presented in this section: (1) system of alloting respondents to interviewers, (2) fieldwork support services, (3) interviewer check-in system, and (4) interview verification system. Each of the above procedures were managed by the NCRVE staff and consultants from Appropriate Solutions, Inc.

Method of assigning respondents to interviewers. Information contained on the school board master list regarding each student selected (e.g., parents' names, home address, telephone number) was transferred to individual forms called "Call Records." These forms were designed for use in assigning respondents to interviewers and for recording telephone and appointment outcomes. Before distributing Call Records to interviewers, respondents were grouped together according to the zip code area of their addresses. Groups of Call Records from one or more zip code areas were

then distributed to each interviewer. The purpose of the clustering system was to minimize travel distance. It was not always possible, however, to assign interviewers to respondents near the interviewer's neighborhood. Each time interviewers completed (successfully interviewed) or resolved (any outcome other than a successfully completed interview) all of the Call Records assigned to them, they were provided with additional Call Records.

Fieldwork support system. A fieldwork office, manned by one or more National Center staff or ASI consultants, was maintained during all periods when interviews were allowed. At this office, staff members responded to telephone calls regarding problems and questions from the field, including calls from respondents requesting changes in appointment times and dates, distributed additional supplies (e.g., questionnaire booklets) to interviewers when needed, and took turns managing interviewer check-in sessions during which interviewers reported to the office to hand in completed questionnaire booklets.

Interviewer check-in system. The interviewer check-in system, in which interviewers reported to the project office once a week to turn in completed questionnaires, enabled project staff to maintain contact with interviewers and to monitor progress of the research operation. Specific tasks accomplished during each check-in session were as follows: (1) completed questionnaire packets were returned to the fieldwork office, logged into entry files, and routed to the coding division; (2) the status of all nonresolved call records held by interviewers was reported to project staff; (3) the numbers of completed cases and nonresolved cases contained in each race and sex category were tallied; (4) new assignments and additional supplies were distributed to interviewers, when necessary; and (5) written weekly updates of procedural changes and clarification were distributed to interviewers.

Interviewer verification system. Ten percent of each inteviewer's home visits were verified by a telephone call to the respondents' home. Respondents were asked questions to confirm that the interview had taken place and that all rules and procedures had been followed. One interviewer left some questionnaires in respondents' homes on one date and picked them up at a later date. This violation of proper procedures was discovered through the verification process. (The effect of this irregularity on data quality remains to be analyzed.) The verification call also enabled respondents to express their thoughts about the survey to project staff.

Coding

Planning for Coding

Planning for the coding operation involved two tasks: (1) designing a system for assigning numeric codes to questionnaire items not already precoded (see explanation of precoded items in Instrumentation Section), and (2) deciding where to record codes so as to facilitate keypunching. Discussion of issues related to each of these tasks is presented below.

Design of procedures for assigning codes. Only two groups of questions contained in the instrument required the assignment of codes: subjective-probability items, and open-ended occupation and industry questions. Most other questions were either precoded, binary code, or fill-in questions requiring no more than the recording of already existent numbers or precodes in a readable form for keypunchers.

The plan developed for coding subjective probability questions called for measuring respondents' checkmarks (see sections on Coding Procedures and Instrumentation for a fuller explanation of how this was done) and recording the value obtained. This measurement necessitated construction of specially scaled rulers during the planning stage. The rulers constructed were 4.25 inches long and marked with 100 equal divisions.

Procedures outlined in the project proposal for coding open-ended occupation and industry questions called for the use of U.S. Bureau of the Census categories used to code employment information collected during the 1970 decennial census. Use of this coding system necessitated a specialized operation in which occupation and industry titles contained in the questionnaire could be looked up in census reference sources.

Toward developing such a system, project staff investigated coding procedures used by the Census Bureau and other research operations using census codes. The following man als were studied: Manual for Coding Occupations and Industries into Detailed 1970 Categories and a Listing of 1970-Basis Duncan Socioeconomic and NORC Prestige Scores (Featherman, Sobel and Dickens, 1975); Social Factors in Aspirations and Achievements Occupation-Industry Coding Handbook (Sheehy, Netkin and Grant, 1974); Occupation and Industry Coding Manual of the Minnesota Labor Force Study (Gustafson, 1977); and the introduction sections of the Alphabetical Index of Industries and Occupations (Alphabetical Index) and the Classified Index of Injustries and Occpations (Classified Index) (U.S. Bureau of the Census, 1971). In addition, project staff gathered suggestions from consultants and other individuals having experience or familiarity with similar coding operations.

From these investigations, numerous ideas for coding occupations and industries were considered. Discussion of these is presented below.

In one study (Sheehy, et al., 1974), coders were divided into two groups: one group coded occupation data into census codes, and the other group coded all other data. Census coders, in this operation, were further subdivided into three groups coding current job information; job expectations; and allocating census codes to all those occupational cases uncodable through usual procedures. In planning for the present coding operation, however, the idea of division of labor for general and census coding initially was rejected, and a nondifferentiated system in which all coders worked with all types of data was adopted. After three weeks of experimentation with the nondifferentiated system, and subsequent to quality checks on the coded data, revisions were adopted creating a division of labor between general coders and census coders. Complete description of the final system is presented in the section on Coding Procedures. Further

explanation of the quality checks responsible for the change in procedures is contained in the section on Quality Checks.

In addition to the system of task specialization, the above study reported a system of independent coding of each questionnaire item related to occupation or industry. The expressed aim of this system was to avoid inter-question bias—the tendency of coders to select a code for one questionnaire item because of knowledge concerning the coding of other questionnaire items. Implimentation of this system meant that coders were permitted to code only one employment-related item per questionnaire at any given time. To accomplish this objective, questionnaires were rotated among coders. Shelf space was allotted and labeled for each occupation and industry question. All incoming questionnaires were placed in the first slot on the shelf, i.e., that slot reserved for the first job or industry question contained in the questionnaire. A coder coded the first entry in a questionnaire and then placed the questionnaire in the next slot. Another coder then coded the second entry. This process continued until all occupation and industry questions in each questionnaire were coded. This method was not adopted for the present study, however, due to the excessive space, time and supervisory efforts necessitated; however, coders were instructed not to allow previous coding decisions to influence their coding of any particular item.

The Minnesota Labor Force Survey employed a system of industry coding based on a listing of all major companies located in the study area (Gustafson, 1977). Firm names contained in the listing were arranged according to the Standard Industrial Classification coding system developed by the U.S. Government Office of Management and Budget. Although this coding system differs from the census system, it was possible to cross-reference these codes to census codes by using one section of the Alphabetical Index of Industries and Occupations. Coders could, therefore, use the listing to locate industry codes for firm names contained in the questionnaires. Although this system varies from census methods, and has some disadvantages (Sheehy, et al., 1974), it has one important advantage of being an easier, more direct method, involving less coder interpretation and judgment than the census method.

The current study decided to adopt a system analogous to the Minnesota technique. A listing of firm names and codes for the study area was obtained in the form of the membership list of the Columbus area Chamber of Commerce. This list contains the names and Standard Industrial Codes (SIC) for approximately one-third of all firms located in Columbus. Although the list was not a complete one, and in spite of other disadvantages, project staff feel that the ease and uniformity introduced by the system effected greater validity of the coded data. Comparison of codes assigned under the original system (the census system in which interpretation and judgment were necessary), and codes assigned under this system support this point.

One problem considered during the planning operation was whether to code the industry of the respondent's specific job or the industry of the respondent's employer. For example, which industry code should be used for an auto mechanic working at Sears Department Store? Although opinion in the literature varied regarding this issue (Sheehy, et al., 1974), the current

study decided to use that industry code which reflected the major activity of the firm. One reason for this decision was that it allowed use of the Chamber of Commerce membership roster for all industry coding.

As a result of preliminary reading about the coding experiences of other operations, project staff anticipated that some respondent entries would be too general or vague for assignment of a single code. One study devised a specialized system to handle this problem (Sheehy, et al., 1974). Table 8 in the 1970 Census of Population Occupation by Industry (U.S. Bureau of the Census, 1972) was used to obtain statistics concerning the number of individuals of each sex working in various occupations. All occupational groups suggested by a respondent's vague entry were referenced in this table. That occupational group containing the greatest number of individuals of the same sex as the respondent was chosen as the most likely job category for the vague entry. The current study decided not to use this system, however. Instead, the decision was made to list all possible codes for the general or vague entry on a special form called a Multiple Code Sheet. The most appropriate of these codes was to be listed on this form as the first entry (in addition to being listed on the coding sheet). The plan for utilizing the additional codes during analysis was to average Duncan SEI codes for all the occupational codes listed on the Multiple Code Sheet.

The Census Bureau's Alphabetical Index of Industries and Occupations contains two types of listings for both industry and occupation titles. The Industrial Classification System (three pages) and the Occupational Classification System (five pages) comprise summaries of all numerical codes and their title headings. (Throughout the remainder of this discussion, these summary lists are referred to as the short list of industries and the short list of occupations.) In addition to the short lists, the Alphabetical Index provides a breakdown of each of the code groups, listing all of the job or industry titles contained within each group.

Initially, the decision was made to use the short lists as the coding reference in census coding. This decision was based on the assumption that the coding operation would be less complicated than the U.S. census operation due to the limited geographical area of respondents, and to restrictions imposed by the relatively simpler design of the questionnaire items used to elicit employment information. The decision also was due, in part, to difficulties in obtaining details regarding specific procedures employed by the Census Bureau, and to project staff's initial lack of appreciation of the complexities of occupational coding. Because of these factors, it was concluded that use of the short lists would be adequate. Routine quality checks performed on the coded data after the first three weeks, however, revealed the invalidity of this system; the result was the recoding of all previously coded occupation and industry entries and the adoption of revised procedures employing the Census' long lists as the reference source for all occupation and industry coding. (See Coding Procedures section for a complete discussion of this system.)

Selection of Procedure for Recording Codes. The second major task included in planning the coding operation was to determine where to record codes to strike an optimum balance between coding time and keypunch time. The idea of recording all codes in the right-hand margin of each

questionnaire booklet was considered but rejected, in favor of transferring all codes to coding forms. The major reason for this choice was the concern for minimizing keypuncher error. Project staff modified the standard Fortran coding form for this purpose. The modified form was blocked with heavy vertical lines to identify each number field, and skipped columns were blacked out.

Coding Procedures

As explained in the section on data collection procedures, completed questionnaire booklets arrived from the field in sets of six (in the case of two-parent families) or four (in the case of one-parent families). Each set also contained separate forms containing facts regarding the pre-interview contacts with the family; supplementary information concerning the interview situation; and information to assist in locating respondents for the second and third data collection panels. Upon receipt, each set of questionnaires was logged in and a disposition form designed to record each step of the operations performed on the questionnaire packet was affixed to the booklets. Questionnaires were then ready to be coded; no precoding edits were done.

Under the revised procedures, five student employees worked as general coders and four as census coders. The former were assigned coding of (1) the subjective probabilities; (2) other closed-ended questions; and (3) all nonoccupation-related, open-ended questions. The latter coded the open-ended occupation and industry questions: (1) parents' current and past occupations, (2) parents' current and past industries, (3) students' occupational expectations, (4) students' occupational aspirations, and (5) perceived occupational expectations of peers.

Steps in coding. Before coding, general and census coders logged out questionnaire booklets. This procedure consisted of recording the family identification number for the set of questionnaires, the coder's initials, and the check-out date in a log designed for this purpose.

(1) General coding - Next, general coders coded all questions assigned to them in order of occurrence. Subjective probability checkmarks were measured and the two-digit values (ranging from zero to 100) indicating the distance between the checkmarks and the zero point of the lines, were recorded. Precoded closed-ended questions were coded by transfering the precode to the coding form. In the case of binary code closed-ended questions, each response alternative was assigned a code of zero or one depending on whether or not it had been checked by the respondent. For nonoccupational open-ended questions (e.g., fill-in questions eliciting information such as ages, dates, number of siblings, etc.), coding usually took the form of transfering the numeric response to the coding form. (It was sometimes necessary to right-justify digits in this process.)

As is typical of coding operations, some responses failed to fit any of the predefined codes. Special codes had to be created for these cases. Some of these special codes are presented later in the discussion.

If a coder had difficulty coding any response, he/she was instructed to seek assistance from the coding supervisor. This procedure and the referral system in which assignment of a code was deferred for later supervisor attention, will be explained in the Referral System section.

After general coders finished coding all questions assigned to them, they recorded their initials on the disposition form attached to the set of questionnaires and placed them in one of two boxes. If completely coded (containing no nonresolved problems), the questionnaires were routed to census coders. If requiring referral (due to the presence of coding problems), the questionnaires were routed to the coding supervisor.

(2) Census coding - Procedures used for census coding constituted a modified version of procedures used by the U.S. Bureau of the Census. (For description of exact procedures used by the Census Bureau, the reader is referred to the 1977 Census of Oakland, California Industry and Occupation Coding Training Manual [U.S. Bureau of the Census, 1977]). Both Census references were used: the Alphabetical Index of Industries and Occupations and the Classified Index of Industries and Occupations. Additionally, the Dictionary of Occupational Titles (D.O.T.) was used for occupational coding, and the 1977-78 Columbus Chamber of Commerce Membership Roster and Directory was used for industry coding. A description of the content and format of each of these volumes is provided below. A step-by-step description of procedures used in coding occupation questions is then presented, followed by a step-by-step description of procedures for industry questions.

The Alphabetical Index of Industries and Occupations lists industry and occupation titles reported in national censuses and surveys conducted by the U.S. Bureau of the Census. The text is divided into two major sections: the first comprises a listing of industry titles; the second, a listing of occupation titles. In each of these sections, titles are listed in alphabetical order on the left side of the page and three-digit codes for each are printed on the right-hand side. In the case of the occupational titles, one or more industry codes, referred to as industry restrictions, sometimes appear in a middle column between the title and code. For a complete explanation of procedures the reader is referred to the introduction of the Alphabetical Index.

In addition to the two major subdivisions, as explained previously, the Alphabetical Index contains an eight-page summary of title headings of all industrial and occupational codes (short lists).

The Classified Index of Industries and Occupations is identical to the Alphabetical Index in its contents; differences between the two volumes are organizational only. In this volume job and industry titles are listed by code category, and all code categories are listed in numerical order by code number.

The 1977-78 Columbus Area Chamber of Commerce Membership Roster and Directory includes a forty-five page alphabetical list of the approximately 2,300 businesses belonging to the Columbus Area Chamber of Commerce. For each firm, a code indicating the firm's classification according to the Standard Industrial Classification (SIC) system is given. In the panel-one

coding operation, coders cross-referenced these SIC codes by consulting the short lists contained in the Alphabetical and Classified Indexes in which both SIC and census codes are listed.

The Dictionary of Occupational Titles (D.O.T.) is published by the U.S. Manpower Administration and contains 35,550 job titles. For each job title, the D.O.T. either describes the job or refers the reader to another (synonomous) title containing a description. Although the order of job titles is by code group, the D.O.T. coding system is specific to the Office of Manpower Administration and differs from the U.S. Census Coding System. Project staff were unable to locate a cross-reference source for the two coding systems for the panel-one coding operation (two partial cross-references were located and used in the panel-two coding operation). It was, therefore, impossible to make any use of the codes provided in the D.O.T.

As evidenced by reference to Appendix A, all of the open-ended occupational questions were comprised of two parts. The first section elicited a job title, the second section, a description of duties involved in the job.

After logging out a questionnaire packet, the first step in occupational coding was to decide whether the job title provided by the respondent in the first section of the question was consistent with the description of duties listed in the second section. This step required judgment on the part of the coder. If convinced that the job title constituted an accurate representation of duties performed, the coder looked the job title up in the Alphabetical Index (long list). If an industry restriction appeared between the title and code (see explanation of Alphabetical Index), it was necessary for the coder to make sure that the industry code for the occupational entry being coded was consistent with those listed in the industry restriction. The final step in coding was to record the three-digit code for the job title on the coding form.

The most common situations complicating these procedures were: (1) omission of a job title in the questionnaire item; (2) suspected inconsistency between the job title and description; and (3) inability to locate the exact wording used by the respondent in the Alphabetical Index. Additional procedures were required in each of these cases.

In cases in which the job title section of the question had not been answered, the coder had to rely on the description of duties provided in the second section of the question. In such cases, the coder was required to determine an appropriate job title based on information provided in the description. The coder then proceeded with the other steps in coding.

Whenever a coder suspected that the job title listed might be an inaccurate indication of duties performed, the D.O.T. or The Encyclopedia of Careers and Vocational Guidance (Hopke, 1977) was consulted. The job title in question was looked up, and the description provided in the D.O.T. or Encyclopedia was compared to the description in the questionnaire. If inconsistency were determined, coders ignored the title and relied on the description of duties provided in the question in determining an appropriate code. This policy was consistent with policy used in a previous study

(Sheely, et al., 1974) and reflects agreement with the argument that job descriptions are usually more accurate than job titles, due to reasons such as inflation of job titles by employers. (Consistent with this policy, coders were instructed to place more weight on the job description in other cases of ambiguity, as well.) Whenever there was complete contradiction between a job title and description, a special code was used (see section on Special Codes).

If the exact words or particular order of words used in a respondent's job title were not found in the Alphabetical Index, the coder looked up other wordings (e.g., "teacher's assistant" instead of "teacher's aide"), or other possible word orders (e.g., "clerk, coding" instead of "coding clerk"). Coders used their own ingenuity, the job description section of the question, the D.O.T., and other sources such as The Encyclopedia in generating these alternatives.

After locating a code in the Alphabetical Index, it sometimes was judged advisable to double check the code in order to obtain further evidence of the appropriateness of the code in representing the respondent's occupation. The short list and the Classified Index were used for this purpose.

Whenever a respondent's occupation entry was too ambiguous for assigning a single code, the usual procedure was to list all possible codes on a special form called the Multiple Code Sheet. That code judged to be the best fit for the entry was listed first and was the only code recorded on the coding form. The rationale for this procedure and the uses suggested for the additional data for the analysis stage have been discussed in the Planning for Coding section. If the entry was judged too general for use of the Multiple Code Sheet, a special code was sometimes used (see section on Special Codes).

The surveys contained two questions eliciting industry information. Both of these questions referred to parents' current or past jobs. Because of the fact that it was often necessary to know the industry code of a job before an occupational code could be assigned, industry questions were coded before occupation questions. In the case of multi-purpose places of business (comprising more than one industry), the major industry of the firm was coded. This was done even if the code disagreed with the specific industry of the respondent's job. For example, a hairdresser working at Sears Department Store was assigned the industry code for department stores instead of hairdressing services. The rationale for this policy has been explained in the Planning for Coding section.

Exact steps in the coding of the industry questions were as follows: (1) the name of the respondent's place of employment was obtained from the questionnaire (form 4 or 6, questions 12 and 18). (2) This name was looked up in the 1977-78 Columbus Chamber of Commerce Membership Roster and Directory in order to obtain a Standard Industrial Classification (SIC) code. (3) The SIC code for the company was cross-referenced, using the industry short list of the Alphabetical Index to obtain the correct census industry code. (4) This census code was recorded on the coding form.

For cases in which the employer's name was not found in the Chamber of Commerce Roster, the company name was looked up in the Directory of Ohio Manufacturers (Ohio Department of Economic and Community Development, 1975) which provides SIC codes for major firms in the State of Ohio. If this attempt proved unsuccessful or if the name of business had been omitted on the questionnaire, coders resorted to routine census procedures for coding industry: the response was read and interpreted by coders and an industry title was looked up in the industry section (long list) of the Alphabetical Index. If located, the three-digit code indicated in the text was recorded. If the exact title could not be located, synonomous titles or alternative word orders were checked.

If the description was missing from the questionnaire or was inadequate, a city directory (Polk, 1977) was consulted, or a telephone call was made to the local public library's business section or the Corporation Registration/Licensing Office of the Ohio Department of State. All of these sources provide at least a brief description of firms and companies when the company name is known or in the case of the State Corporation Registration Office, if the company is incorporated.

For both occupational and industry coding, two additional resources developed before and during the coding operation proved useful. These were: (1) file boxes containing resolutions of problem cases encountered in two previous studies, and (2) the referral sheet notebook containing a record of resolutions of problems encountered in the current study. Coders could consult either or both of these two resources at any point in the coding operation, in lieu of any of the steps outlined above.

Whenever occupation/industry coders were unable to code entries effectively and quickly, they requested supervisor help. As in the case of resolutions of nonoccupational problems, resolutions reached through this procedure were always recorded in the Resolution Log for later review and approval by other staff members.

Special Codes. Procedures used in the coding operation included use of unique codes designated for the coding of unanticipated responses. Project staff either invented these codes or redefined already existing census codes for usage in such cases. The two reasons for special codes were to correct for the inadequacies of the already defined coding system and, especially in the case of occupational information, to preserve as much information as possible, even if the information were somewhat vague or incomplete. Two of the special codes are particularly interesting and, therefore, are described below.

(1) Industry and allocation codes - whenever possible, either census industry codes or census allocation codes were used to code those occupational entries that were too vague for the assignment of single or multiple occupation codes. For example, when a respondent provided the nonspecific response of "works in a department store," the census industry code for department store was assigned (instead of attempting to list all possible occupation codes relevant to "department store" on a multiple code sheet, or using the missing data code) thereby preserving this item of information. When a respondent listed "professional job", the occupation allocation code 196 for "professional technical and Kindred Workers" was

used. This procedure was used only as a last resort in the coding of occupational entries due to the fact that such codes lack Duncan SEI equivalents.

(2) Code for contradictory responses - Previous discussion has explained procedures for coding cases involving partial contradiction between job titles and job description (see section on Coding Procedures). For cases in which there was complete contradiction, a special code "-33" was invented. In addition to listing this code on the coding form, coders listed this code on the Multiple Code Sheet followed by appropriate codes to represent both the job title and the job description. Although the panel-one analysis made no use of these codes, potential usages do exist and will be considered in future panel analyses.

Problem referral system. As mentioned previously, cases of general and census coding that could not be coded by routine steps were referred to supervisors. Referral procedures are outlined below.

The referral system relied upon a form called the referral sheet on which the problem and eventually the resolution and all steps leading to it were recorded. In the first step, the coder recorded the problem on the referral sheet and inserted the sheet inside the questionnaire booklet. The set of questionnaires was then routed to supervisors. Initially, all referred cases were read, researched and solved, if possible, by one staff member and then routinely checked by a second staff member. If the second staff member disagreed with the resolution, the case was reviewed by the project director whose decision was considered final. This plan remained in effect thoughout the first half (approximately six weeks) of the coding operation. The number of project staff involved in resolving coding problems was reduced during the second half of the coding operation.

The task of supervising coding shifts was rotated among three staff members. All decisions made by the supervisor of a coding shift were recorded in the Resolution Log. This system served two purposes. First it created a permanent record of decisions made. Among other things, this meant that if later developments or decisions dictated a change in a coding rule, all cases coded under the old rule could be referenced and changed. Secondly, the Resolution Log enabled decisions made by the supervisor of one shift to be communicated to supervisors of other shifts, thereby contributing to consistency of procedures across coding shifts. Supervisory staff also composed and distributed weekly updates of changes in procedures and points of clarification to coders.

Quality checks. A special quality check across all coders was completed approximately three weeks after the start of the coding operation. At least one-third of each of the nine coder's work was checked on all nonoccupational questions. At a later point a check of coding on all occupation and industry questions was completed. As a result of these two checks, changes described above in the coding operation were made after the first month.

Subsequent to the special quality check across all coders, coding on all questionnaire items was checked for a randomly selected ten percent of all questionnaires. This ten percent quality check was continued routinely throughout the remainder of the coding operation.

After the data were coded and keypunched, a computer program was written to check each variable for numerical values outside of the valid range for the variable. Using this program, accuracy of both the coded and keypuched data was checked and illegal values corrected.

Coder training. Coder training at the beginning of the coding operation consisted of an hour and a half orientation to the questionnnaires, the coding form, the codes, and coding procedures. Coders were taught how to measure the subjective probabilities, how to distinguish and code precoded and binary code questions, when and how to right-justify numerical entires for the nonoccupational open-ended questions, and how to code the open-ended industry and occupation questions. Much of the instruction consisted of a practice coding session using a set of completed questionnaires followed by a group discussion and correction session.

Retraining of census coders after the first three weeks involved explanation of step-by-step procedures as outlined in the section on Coding Procedures and explanation of rules for the coding of special cases.

REFERENCES

Alexander, Karl L., and Eckland, Bruce K. "Basic Attainment Processes: A Replication and Extension." Sociology of Education 48(1975):457-495.

Alexander, Karl L.; Eckland, Bruce K.; and Griffin, Larry J. "The Wisconsin Model of Socioeconomic Achievement: A Replication." American Journal of Sociology 81(1975):324-342.

Anderson, Theodore Wilbur. An Introduction to Multivariate Statistical Analysis. New York: Wiley, 1958.

Annabele, James E., Jr., and Fruitman, Frederick. "An Earnings Function for High-Level Manpower." Industrial and Labor Relations Review 26(1976):1107-1121.

Bachman, Gerald. Youth in Transition. Ann Arbor: Institute for Social Research, 1970.

Blau, Peter M., and Duncan, Otis D. The American Occupational Structure. New York: John Wiley and Sons, 1967.

Blau, Peter M.; Gustad, N.W.: Jessor, R.; Parnes, Herbert S.; and Wilcox, R.C. "Occupational Choice: A Conceptual Framework." Industrial and Labor Relations Review 9(1956):531-543.

Buros, Oscar K. The Seventh Mental Measurement Yearbook. Highland Park, NJ: The Gryphon Press, 1972.

Christ, Carl F. Econometrics Models and Methods. New York: John Wiley and Sons, Inc., 1966.

Coleman, James S. "The Mathematical Study of Change." In Methodology in Social Research, edited by Hubert M. Blalock and Ann B. Blalock. New York: McGraw-Hill Book Company, 1968.

Columbus Area Chamber of Commerce. Columbus 1977-78 Roster and Reference Directory. Columbus, Ohio: Windsor Publications, Inc., 1978.

Crider, Donald M.; Willits, Fernk; and Bealer, Robert C. "Tracking Respondents in Longitudinal Surveys." Public Opinion Quarterly 35(1971):613-620.

Curry, Evans W.; Hotchkiss, H. Lawrence; Picou, J. Steven; Scritchfield, Shirley A.; Stahura, John M.; and Salomone, Jerome. Significant Other Influence and Career Decisions: Volume II. Black and White Female Urban Youth. Columbus, Ohio: The Ohio State University, The National Center for Research in Vocational Education, 1978.

Curry, Evans W.; Picou, J. Steven; Hotchkiss, Lawrence; Scritchfield, Shirley A.; and Stahura, John M. Significant Other Influence and Career Decisions: Volume I, Black and White Male Urban Youth. Columbus, Ohio: The Ohio State University, The National Center for Research in Vocational Education, 1976.

Dohrenwend, Barbara S., and Dohrenwend, Bruce P. "Sources of Refusals in Surveys." Public Opinion Quarterly 32(1968):74-83.

Doreian, Patrick, and Hummon, Norman P. "Models of Stratification Processes." Quality and Quantity 8(1974):327-345.

Dudley, Gordon A., and Tiedeman, David V. Career Development: Exploration and Commitment. Muncie, Indiana: Accelerated Development, Inc., 1977.

Featherman, David L., and Hauser, Robert M. Opportunity and Change. New York: Academic Press, 1978.

Featherman, David L.; Sobel, Michael; and Dickens, David. "A Manual for Coding Occupations and Industries into Detailed 1970 Categories and a Listing of 1970-Basis Duncan Socioeconomic and NORC Prestige Scores." Working paper #75-1. Madison, Wisconsin: Center for Demography and Ecology, University of Wisconsin, 1975.

Fisher, Franklin M. The Identification Problem in Econometrics. New York: Robert E. Krieger Publishing Company, 1976.

Freeman, Richard B. The Market for College-Trained Manpower: A Study of the Economics of Career Choice. Cambridge: Harvard University Press, 1971.

Ginzberg, Eli; Ginsburg, Sol W.; Axelrad, Sidney; and Herma, John L. Occupational Choice: An Approach to a General Theory. New York: Columbia University Press, 1951.

Goldberger, Arthur S. "Structural Equation Models: An Overview." In Structural Equation Models in the Social Sciences, edited by Arthur S. Goldberger and Otis D. Duncan. New York: Seminar Press, 1973.

Goldberger, Arthur S. Econometric Theory. New York: John Wiley and Sons, 1964.

Gustafson, Kathleen. Minnesota Labor Force Survey Occupation and Industry Coding Manual. Unpublished. St. Paul: Minnesota State Planning Agency, 1977.

Haller, Archibald O., and Miller, Irwin W. The Occupational Aspiration Scale: Theory, Structure, and Correlates. Cambridge: Schenkman Publishing Company, 1971.

Haller, Archibald O., and Portes, Alejandro. "Status Attainment Processes." Sociology of Education 47(1973):51-91.

Haller, Archibald O.; Otto, Luther B.; Meier, Robert F.; and Ohlendorf, George W. "Level of Occupational Aspiration: An Empirical Analysis." American Sociological Review 39(1974):113-121.

Hammond Almanac, Incorporated. The Hammond Almanac of a Million Facts, Records, Forecasts. 10th annual edition. New Jersey: Hammond Almanac, Inc., 1979.

Hauser, Robert M. "Disaggregating a Social-Psychological Model of Educational Attainment." Social Science Research 1(1972):159-188.

Hauser, Robert M.; Dickinson, Peter J.; Travis, Harry P.; and Koffel, John N. "Structural Changes in Occupational Mobility among Men in the United States." American Sociological Review 40(1975a):585-598.

Hauser, Robert M., and Featherman, David L. The Process of Stratification: Trends and Analyses. New York: Academic Press, 1977.

Hauser, Robert M.; Koffel, John N.; Travis, Harry; and Dickinson, Peter J. "Temporal Change in Occupational Mobility: Evidence for Men in the United States." American Sociological Review 40(1975a):279-297.

Henmon, V.A.C., and Nelson, M.J. The Henmon-Nelson Test of Mental Ability. Boston: Houghton-Mifflin Company, 1942.

Henry, Neil W., and Hummon, Norman P. "An Example of Estimation Procedures in a Nonrecursive System." American Sociological Review 36(1971):1099-1102.

Hopke, William (Ed.). The Encyclopedia of Careers and Vocational Guidance, vol. II, 3rd ed. Chicago: J.G. Ferguson Publishing Company, 1977.

Hotchkiss, Lawrence. Differential Equations in Status-Attainment Research: Conceptualization and Calculation. Columbus, Ohio: The National Center for Research in Vocational Education, The Ohio State University, 1979a.

Hotchkiss, Lawrence. "A Conceptual-Measurement Model for Career Expectations." Paper presented at the 1979 annual meetings of the Midwest Sociological Society. Columbus, Ohio: The Ohio State University, The National Center for Research in Vocational Education, 1979b.

Hotchkiss, Lawrence. "A Technique for Comparing Path Models Between Subgroups." Sociological Methodology and Research 5(1976):53-76.

Hotchkiss, Lawrence; Curry, Evans W.; Haller, Archibald O.; and Widaman, Keith. "The Occupational Aspiration Scale: An Evaluation and Alternate Form for Females." Rural Sociology 44(1979):95-118.

Hout, Michael, and Morgan, William R. "Race and Sex Variations in the Causes of the Expected Attainments of High School Seniors." American Journal of Sociology 81(1975):364-394.

Hurwicz, Leonid. "Prediction and Least Squares." In Statistical Inference in Dynamic Economic Models, edited by T.C. Koopmans. New York: John Wiley and Sons, 1950.

Johnston, J. Econometric Methods. New York: McGraw-Hill, 1963.

Kahl, Joseph A. "Educational and Occupational Aspirations of 'Common Man' Boys." Harvard Educational Review 23(1953):202.

Kerckhoff, Alan C. Educational, Familial, and Peer Group Influences on Occupational Achievement. Final Report to the U.S. Department of Health, Education and Welfare, The Office of Education, 1971.

Kerckhoff, Alan C., and Huff, Judith L. "Parental Influence on Educational Goals." Sociometry 37(1974):307-327.

Koopmans, Tjalling C. "Identification Problems in Economic Model Construction." In Studies in Econometric Method, edited by William C. Hood and Tjalling Koopmans. New York: John Wiley and Sons, Inc., 1953.

Koopmans, T.C.; Rubin, H.; and Leipnik, R.B. "Measuring the Equation Systems of Dynamic Economics." In Statistical Inference in Dynamic Economic Models, edited by T.C. Koopmans. New York: John Wiley and Sons, Inc., 1950.

Kuvlesky, W.P., and Bealer, R.C. "A Clarification of the Concept of 'Occupational Choice'." Rural Sociology 31(1966):265-276.

Land, Kenneth C. "Significant Others, the Self-Reflexive Act and the Attitude Formation Process: A Reinterpretation." American Sociological Review 36(1971):1085-1098.

Lane, Angela. "The Occupational Achievement Process, 1940-1949: A Cohort Analysis." American Sociological Review 40(1975):472-482.

Malinvaud, E. Statistical Methods of Econometrics: Studies in Mathematical and Managerial Economics. Edited by Henri Theil. Chicago: Rand McNally and Company, 1976.

Marschak, Jacob. "Economic Measurements for Policy and Prediction." In Studies in Econometric Method, edited by William C. Hood and Tjalling Koopmans. New York: John Wiley and Sons, Inc., 1953.

Ohio Department of Economic and Community Development. 1975 Directory of Ohio Manufacturers, 29th ed. Cleveland, Ohio: Harris Publishing Company, 1975.

Picou, J. Steven; Curry, Evans W.; and Hotchkiss, H. Lawrence. Significant Other Influence, Career Choice and Achievement: Selected Theoretical and Conceptual Approaches. Columbus, Ohio: The Ohio State University, The Center for Vocational Education, 1976.

Platt, O. Ordinary Differential Equations. San Francisco: Holden-Day, 1971.

Polk, R.L. & Co. Columbus City Directory. Taylor, MI: R.L. Polk & Co., 1977.

Porter, James N. "Race, Socialization, and Mobility in Educational and Early Occupational Attainment." American Sociological Review 39(1974):303-316.

Rehberg, Richard A., and Hotchkiss, Lawrence. "Educational Decision Makers: The School Guidance Counselor and Social Mobility." Sociology of Education 45(1972):339-361.

Rehberg, Richard A., and Rosenthal, Evelyn R. Class and Merit in the American High School: An Assessment of the Revisionist and Meritocracy Arguments. New York: Longman, Inc., 1978.

Reiss, Albert J., Jr. Occupations and Social Status. New York: The Free Press, 1961.

Schuman, Howard, and Converse, Jean M. "The Effects of Black and White Interviewers on Black Respondents in 1968." Public Opinion Quarterly 35(1971):44-68.

Scientific Research Associates. SRA Catalogue for Business. Chicago: Scientific Research Associates, Inc., ____.

Sewell, William H.; Haller, Archibald O.; and Ohlendorf, George. "The Educational and Early Occupational Attainment Process: Replications and Revisions." American Sociological Review 35(1970):1014-1027.

Sewell, William H.; Haller, Archibald O.; and Portes, Alejandro. "The Educational and Early Occupational Attainment Process." American Sociological Review 34(1969):82-92.

Sewell, William H., and Hauser, Robert M. Education, Occupation, and Earnings: Achievement in the Early Career. New York: Academic Press, 1975.

Sewell, William, and Hauser, Robert. "Causes and Consequences of Higher Education: Models of the Status Attainment Process." American Journal of Agricultural Economics 53(1972):851-861.

Sewell, William H., and Shah, Vimal P. "Socioeconomic Status, Intelligence, and the Attainment of Higher Education." Sociology of Education 40(1967):1-23.

Sheehy, Linda; Ketkin, Debbie; and Grant, Jim. Social Factors in Aspirations and Achievements Occupation - Industry Coding Handbook 1974-75. Madison: Center for Demography and Ecology, University of Wisconsin, 1974.

Spaeth, Joe L. "Vertical Differentiation among Occupations." American Sociological Review 44(1979):746-762.

Super, Donald E. "A Theory of Vocational Development." The American Psychologist 8(1953):185-190.

Super, Donald E. The Psychology of Careers: An Introduction to Vocational Development. New York: Harper and Brothers, 1957.

Taylor, D. Garth. "The Accuracy of Respondent-Coded Occupation." Public Opinion Quarterly 40(1976):245-255.

Tiedeman, David V., and O'Hara, Robert P. Career Development: Choice and Adjustment. New York: College Entrance Examination Board, 1963.

U.S. Bureau of the Census. 1977 Census of Oakland California Industry and Occupation Coding Training Manual. Washington, D.C.: U.S. Government Printing Office, 1977.

U.S. Bureau of the Census. 1970 Census of Population Alphabetical Index of Industries and Occupations. Washington, D.C.: U.S. Government Printing Office, 1971.

U.S. Bureau of the Census, 1970 Census of Population Classified Index of Industries and Occupations. Washington, D.C.: U.S. Government Printing Office, 1971.

U.S. Bureau of the Census. 1970 Census of Population Occupation by Industry. Washington, D.C.: U.S. Government Printing Office, 1972.

U.S. Department of Labor. Dictionary of Occupational Titles, 4th ed. Washington, D.C.: U.S. Government Printing Office, 1977.

Warner, W. Lloyd; Low, J.O.; Lunt, Paul S.; and Srole, Leo. Yankee City. Edited by W. Lloyd Warner. One volume, abridged edition. New Haven and London: Yale University Press, 1963.

Wilcox, Elane N. "Patient Follow-Up: Procedures, Technics, and Devices for Improvement." American Journal of Public Health 55(1965):1741-1756.

Williams, Constance M. "Occupational Choice of Male Graduate Students as Related to Values and Personality: A Test of Holland's Theory." Journal of Vocational Behavior 2(1972):39-46.

Wilson, Kenneth L., and Portes, Alejandro. "The Educational Attainment Process: Results from a National Sample." American Journal of Sociology 81(1975):343-363.

Woelfel, Joseph, and Haller, Archibald O. "Significant Others, the Self-Reflexive Act and the Attitude Formation Process." American Sociological Review 36(1971):74-87.

Woelfel, Joseph, and Haller, Archibald O. "Reply to Land, Henry, and Hummon." American Sociological Review 36(1971b):1102-1103.

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